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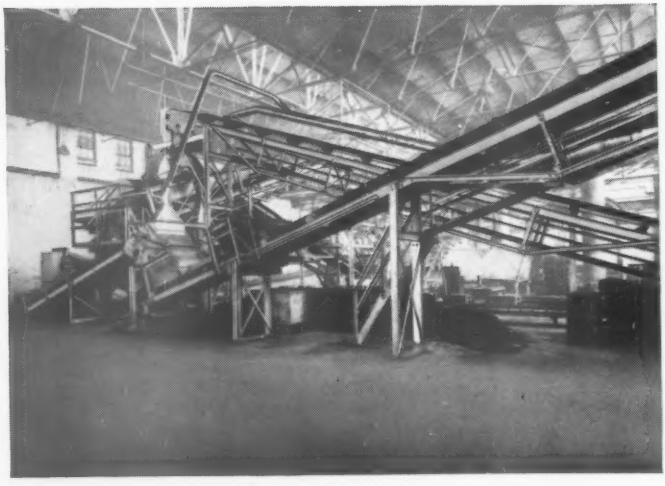

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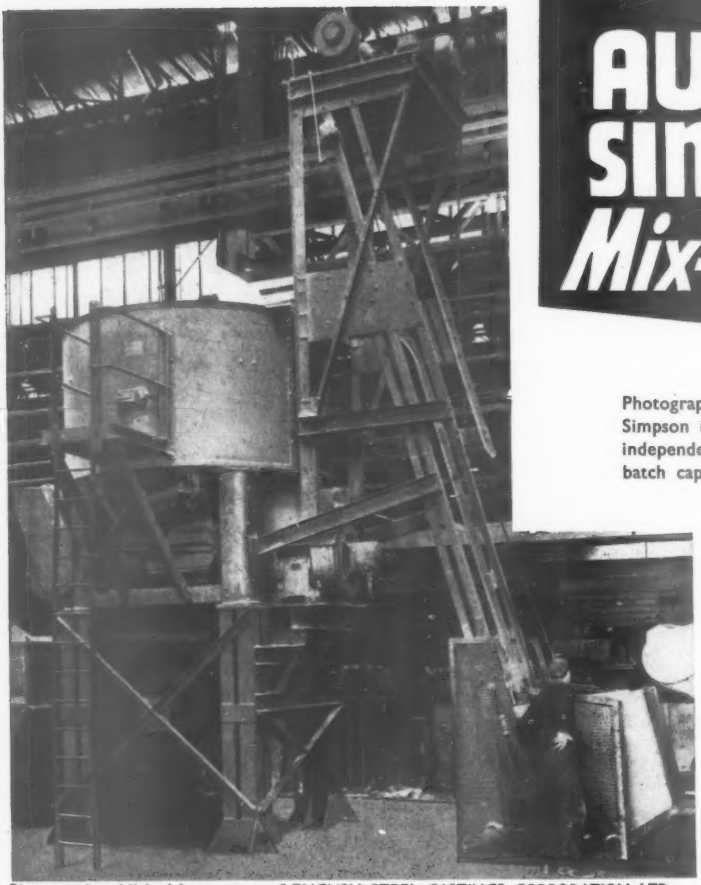
SAND MIXING

THE MODERN WAY WITH AUGUST-SIMPSON Mix-Mullers



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FOUNDRY
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International Apprentice Competitions

Some ten years ago, an enterprising organization in Spain held a national competition, using regional elimination tests, to find the best apprentice in the country. Then in 1951, Spanish lads were pitted against those of Portugal. The next step was to make it international and in 1955, there was one entry for Britain, six in 1956, 12 in 1957, whilst this year, 20 lads have been selected to go to Brussels, the venue of this year's competition. These competitions are now covering 21 trades, and foundry practice. For the last two years, the British organization has been in the capable hands of the City and Guilds of London Institute.

This year, there were no entrants for the foundry practice student, probably on account of the competition emanating from European foundry employers' organization. Moreover, the classification did not appear on the first printed notice, of the competition, due to some lack of definite information from headquarters. However, there was some response for the patternmakers competition and seven entries were received. The president of the National Society of Master Patternmakers (Mr. R. Scott), and Mr. B. Levy—a past-president—acted as judges and two boys of differing age groups have been selected to go to Brussels. It is of some interest to note that no entries were received from the independent shops, as the master patternmakers were unaware of its existence until too late. Last year, it will be remembered that one or two boys went to Spain, these boys being trained at Birmid Industries shops.

It is to be regretted that the City and Guilds of London Institute cannot guarantee the continuance of their participation as organizers, as with its growth, despite enthusiastic industrial co-operation, it is becoming too onerous for the staff. No definite decision has been taken and should continuity, which is obviously desirable, be decided upon, then the present chaotic condition of offering two foundry-practice international competitions could be straightened out. With its wealth of experience and great reputation and its wide industrial connections, the City and Guilds is obviously an excellent organization for handling what is admittedly a difficult proposition.

Retirement of Harry Sherburn

Mr. Harry Sherburn, who for the last eight years has been the managing director of the Grappenhall and Palatine Works of Radiation Limited, at Warrington, has retired after 57-year's continuous service with these companies. at Warrington. Following his early training in Falkirk under his father, the late Mr. W. H. Sherburn, his service with Richmonds Gas Stove Company, Limited, and Fletcher Russell & Company, Limited, dates from 1901. Nearly 40 years of Mr. H. Sherburn's service has been in a managefial capacity, a record of achievement perhaps unprecedented in the industry. He has played a distinguished part, as did his father before him, in the design and development of the many successful appliances produced at Warrington during his long career there, and his wisdom and great experience have made a major contribution to the gas industry in many fields. Mr. Sherburn will for the time being act in a consultative capacity to the Radiation board.

Mr. H. Sherburn

At a recent ceremony at Grappenhall Works at Warrington, which was attended by representatives from every branch of Radiation, Limited, the chairman, Mr. W. Donald King, made presentations to Mr. and Mrs. H. Sherburn to mark Mr. Sherburn's retirement. The presentation to Mr. Sherburn, which took the form of a cheque which he later handed to the Richmonds Benevolent Fund, was subscribed to not only by all sections of Radiation but also by friends and well-wishes from the foundry industry, in which he took a profound and practical interest. He is a past-president of the Lancashire branch of the Institute of British Foundrymen.

Borough Polytechnic Courses

Borough Polytechnic, Borough Road, London, S.E.1, announce a course of eight lectures to be delivered on Wednesday evenings at 7 p.m., commencing on October 8. The course is organized to provide a detailed and up-to-date survey of some selected methods of metal finishing and related topics. These will include not only lectures in technological topics but also in human relations in the plating industry, and costing. The fee for the course of eight lectures is £1, and further details are available from the principal of the Polytechnic at the address quoted.

Other courses of lectures which are being offered at the Polytechnic deal with various aspects of fuel technology. They include (1) Fuel Technology, to prepare students for the examinations in this subject by the City and Guilds of London Institute. This course may be taken either on a part-time day or an evening basis. (2) Fuel and Combustion Engineering, which is offered as an endorsement to the higher national certificate course in mechanical engineering. These classes are held on Monday evenings from 6.30 to 9 p.m., and (3) Oil-burning Technology, a course of lectures held on Friday afternoons from 2.30 to 4.30 p.m.

Mr. F. L. DONNISON has been elected to the Board of Hick Hargreaves & Company.

Latest Foundry Statistics

Copper-base Castings: The first five months of this year show a decline in the production of copper-base castings. According to the returns issued by the British Bureau of Non-Ferrous Metal Statistics, the fall was to 31,487 tons as compared with 32,721 tons in 1957. The May output was 6,241 tons. *Steel Foundries:* Figures taken out on May 10, and reported in the *Bulletin* of the British Iron and Steel Federation and the Iron and Steel Board, show that there was a decline of 260 in the number employed in steelfoundries, compared with those taken on April 5. The May total was 20,100. The average weekly output of steel castings during May was 5,500 tons. The figure in April was 5,700 tons, and a year ago 6,900 tons; all figures being subject to amendment.

Ironfounding: According to the Council of Ironfoundry Associations the following number of ironfoundry workers were employed in the United Kingdom during the week ending May 31: Males, 124,796 and females, 8,999, making a total of 133,795. The corresponding earlier figures were: May 3, 134,875 and June 1, 1957, 137,025.

Canada's Vast Potential for British Industry

"The necessity—if we are to achieve our object of redressing our adverse balance of trade with Canada—of aggressive salesmanship, comprehensive service, advertising, and sales promotion on an adequate scale, needs to be repeated almost to the point of becoming boring," said Sir William Rootes, chairman of the Dollar Exports Council and leader of the trade delegation which visited Canada earlier this year. He was speaking at a conference last Thursday when he presented the delegation's "Report to Industry."

In spite of big developments, only the surface of the vast potential in Canada had been scratched and this and other factors made the Canadian market one of the most important—and one of the most challenging—in the world, he said.

Sheffield IBF Jubilee

On the actual 50th anniversary of the day of the inauguration of the Sheffield branch of the Institute of British Foundrymen, Lord Hives is to give a lecture in the Mappin Hall, Sheffield University, St. Georges Square. This day is October 31. On November 1, the works of the Sheepbridge Iron Company, Limited, are to be visited as Mr. H. Pilkington, the first president of the branch, was on the staff of this works. Luncheon is being offered by the Staveley Iron & Chemical Company, Limited, to the guests. Afterwards there is to be a coach tour through Derbyshire, whilst in the evening there is to be a jubilee dinner/dance at the Grand Hotel, Sheffield.

National Society of Master Patternmakers

If variety be the spice of life, then the programme proposed by the Council of the National Society of Master Patternmakers for next session should be particularly aceptable. It includes visits to a cigarette factory; an oil refinery; a colliery; docks; an india-rubber works and a USA airfield. The annual general meeting, at the special request of Coventry-area members, is to be held at a seaside resort and Brighton has been selected.

Private Enterprise Goes Ahead

Castings, Limited Expand Malleable Facilities

(*Continued from page* 107)

The first part of this report on Castings, Limited's expansion at Brownhills, Staffordshire, discussed the genesis of the scheme as a whole and some of the problems which were encountered as, stage by stage, idea became reality. In what follows the account turns to the actual working of the foundry and the processes at present under way are described and assessed in relation to the original plan. It is hoped that in this way a full picture has been given of the project and its final realization.

Plant and Process Summary

Having now outlined the general considerations and described the main features of the plant, it is proposed in what follows to report on the actual working of the foundry to date and to comment on the processes and schemes adopted. It will thus be seen how far the planning considerations have "borne fruit" in practice.

Melting Practice

The twin cupolas, naturally, are operated on alternate days, the sequence of operations being as follows: Prior to a day's melt, the cupola is chipped out, fettled and patched to a diameter of 22-in. in the well and melting zone and extending to a height of 36-in. above the centreline of the four circular horizontal tuyeres. Above this section, the diameter is then tapered to 27-in. dia. over 6 in. and then there is a 12-in. height at this diameter followed by enlargement to 30 in. over a further 6 in., this being the stack diameter. The sand bottom is then carefully rammed in black sand to definite shape and slopes, leading to the 2-in. dia. taphole. The refractory used for the taphole and tapping box consists of silica sand plus 15 per cent. plumbago and 10 per cent. bentonite. This tapping box, formed by ramming with a small pneumatic tool, is knocked out and renewed weekly.

Lighting-up

When all is ready, the taphole is lightly, but firmly sealed and then the bottom of the bed is covered with large cokes carefully positioned in relation to the taphole, after this, the breast is made up, the breastplate positioned, the joint rammed up and the breastplate locked in place. Coke is then charged by means of the skip hoist (this is done after the day's charging of the cupola in use has ceased) to a height of some 50-in. above the tuyeres.

Then, at 10 p.m. on the day preceding a melt on the prepared furnace, a 4-in. dia. hole between the tuyeres and the sand bottom is used for the introduction of a gas torch to ignite the coke. This is to make sure that the coke bed is well and truly alight at 6 a.m. next morning when the cupola chargehand arrives. The furnace tapping-box is also equipped with a compacted-combustion type of gas-burner which is normally lit at 10 p.m., to ensure that the taphole and tapping box are hot and completely dry before melting commences. The cupola launder is covered with bricks and is heated by the same burner and also from underneath by the flues from the gas burner used for preheating the Roper receiver—which, normally, is also lighted at about 10 p.m.

FIG. 12.—*Ventilated knock-out embodying push-button push-off of moulds from the pallet conveyor; much of the transport within the works is by simple lift trucks adapted to take stillages, castings are never put down on the floor.*

After the requisite amount of coke has been charged on the previous evening, a final check is made that the gas valves in the common chamber between the cupola off-takes are closed and that the tuyeres are open. It is then an additional duty of the man engaged on the annealing plant during the

night to light and keep a check on the various gas burners at the requisite times.

It will be appreciated by readers that the cupola holds some 12 metallic charges, each of 500 lb., and that the receiver will hold about five or six metal charges. Charging of the cupola in operation on any given day, therefore, finishes relatively early (at about 3.30 p.m.) and the charging staff before finishing work each evening have thus the opportunity of preparing for the following morning's start. These preliminaries are particularly important in order to obtain the desired close control of metal composition.

"Dividing the Indivisable"

Details of the charge make-up will be quoted later, but basically, 10 per cent. hematite pig-iron (50 lb. per charge) is a constant ingredient; as each lump of hematite pig can vary from 27 lb. to 47 lb. per piece, an obvious difficulty is apparent here. This difficulty has been overcome in practice by weighing accurately and placing in small piles sufficient pig-iron to total five complete charges. With practice, it turns out that a surprisingly consistent number of pieces of pig is needed for each five charges, and it is then the cupola charger's duty to apportion the total number present in the heap among the five separate consecutive charges. The chargers are provided with a covered-in runway on which is suspended a dial weigher (by Ashworth Ross) calibrated up to 1,000 lb. by 5-lb. divisions, which is connected, on the weighbridge principle, to a suspended tipping skip (Fig. 2). Some 80 charges per day are handled in this way by two men, plus an additional general labourer who services not only the area adjacent to the runway with the various materials, but also helps the man fettling the cupola, removes slag bogies when required, etc. Sufficient coke of established moisture content is stored under cover (adjacent to the runway) for the first 20 or so charges, after which period of melting the laboratory staff can make the necessary moisture compensation to establish a true dry weight of coke per charge (in the manner previously described).

Melting Commences

As stated, the cupola chargehand arrives at 6 a.m., his first job being to check that the bed is thoroughly burned through and after poking the tuyeres well, to adjust the bed height to 4 ft. 6 in. above the centreline of the tuyeres, using a special yardstick for this purpose. He then lights the pilot gas-burner on the recuperator, checks his tapping box and receiver and makes slight repairs if necessary. The cupola charging staff arrive at 6.30 a.m. and commence charging, putting on at least 10 charges immediately. The blowing fan is switched on at 6.55 a.m. being controlled by the Foxboro-Yoxall instrument. Blowing is commenced at 60,000 cub. ft. per hr.; after 10 min. this is reduced to 58,000 cub. ft. per hr. and after a further 10 min. to 55,000 cub. ft. per hr, at which value the blast is then held constant for the remainder of the morning. The town's-gas burner in the recuperator is turned on immediately blowing commences, being automatically ignited by the pilot burner. Droplets of molten iron are visible at the tuyeres within seven minutes after "wind-on." Because of the small capacity of the well, an oxygen torch is always ready for opening the taphole if necessary at this stage, but is rarely used. Some 30 to 35 min. after "first metal," slag appears and flows freely into the tapping box, which is kept covered with charcoal. No gas-heating is used on the tapping box whilst the metal is running. Metal is very hot at this stage and temperatures of up to 1,600 deg. C. are often reached before the receiver is first completely filled.

Combustion air (bled off the air-supply main prior to the orifice plate) is set initially to take 150 cub. ft. per min. The relevant cupola top-gas valve is opened (approximately 10 min. after "wind-on") to admit cupola top-gas to the combustion chamber of the recuperator. Then as the quality of this cupola-gas improves, combustion air is increased to 400 cub. ft. per min. to burn this to oxidizing conditions of combustion, and, just prior to the hot blast reaching the desired temperature of 430 deg. C. (an optimum value established in early experiments), the town's gas is shut off and not introduced again until the lunchtime shut-down.

Pig-iron for Walsall

Reference has already been made to the overall policy of providing the firm's Walsall foundry with refined pig-iron from any surplus metal melted at the Brownhills works and this procedure proves a very useful expedient in the first stage of a melt as, in spite of the well-preheated receiver and almost "overheated" metal at the cupola spout, there is a considerable temperature loss observable in the first five to seven cwt. of metal withdrawn from the receiver. This first metal is therefore always poured into pig moulds (made on the Nicholls moulding machines) and itself also helps to preheat the ladles. The "pigging" of this early metal is recognized and allowed for, in-so-much as the first cupola charges consist mainly of white-iron scrap with sufficient ferro-silicon and ferro-manganese additions to obtain an average analysis suitable for melting at Walsall. After such pigging, and when temperature checks in the 60-lb. capacity pouring-ladle indicate that metal at 1,420 deg. C. has been reached—which has proved adequate for the class of work involved—the casting of production moulds commences. A typical spout or tapping-box metal temperature record is shown in Fig. 4, this shows that the very hot start and the characteristic drop for which there is, as yet, no adequate explanation, but which in practice is minimized by the use of an extra coke-split of some 70 lb. which is charged at such a time as to reach the melting zone to coincide with this temperature drop. Only one further extra coke split is charged during the day, this being at the start of melting after the lunchtime shut-down.

FIG. 13.—*Section of the "white" castings knock-off and cleaning department; note the ventilated knock-off booths along the side and the shotblast plant in the rear. When delivered from the knock-out, the stillages of castings are kept in a definite sequence and, in this manner, they pass through subsequent processing so that identity is retained until the laboratory report on metal quality is approved.*

Blast Control

The hot-blast temperature in this installation is not automatically controlled. Whilst this may be desirable, it is not considered essential, as with the ideal of a constant melting-rate—achieved by using constant air and dry coke—control of the only real variable (hot-blast temperature) is achieved manually by the cupola chargehand. This has proved very simple to effect in practice; at the base of the recuperator firebox, the dust-catcher slide has been calibrated in "inches of opening" and experience of the plant is now such that if the hot-blast temperature increases, the slide is opened a predetermined amount and cold air is thus drawn into the firebox. This air not only reduces the blast temperature but also ensures that the atmosphere inside the recuperator is oxidizing—a necessary condition to ensure long life of the alloy-steel recuperator. Should the supply of air by such means prove inadequate, the opening of the top-gas valve is reduced to cut down the supply of cupola gas to the recuperator and thus, in turn, to reduce the temperature of the blast.

Melting Records

Charge details, analyses, etc., are shown in Fig. 5—the record for a typical day's operation. From this, it will be observed that carbon and silicon contents in the metal cast are checked hourly and manganese every half-hour. Should any major deviation from the desired composition occur, the resulting castings can be detected and scrapped. This is effected by the procedure of handling after the knock-out (Fig. 12), where castings, with runners attached, are pulled off the grid and loaded into a standard type of stillage. These are moved into the "knock-off" area—*i.e.*, where runners and heads are removed (Fig. 13)—and placed in a definite sequence pattern. Therefore, in any case of there being doubt about composition, by quickly checking the manganese contents of a series of stillaged castings, it has been found possible in practice to locate and reject in good time any castings resulting from a period of abnormal melting—though this is a very rare occurrence at Brownhills nowadays.

Moulding

As intimated earlier, the moulding line is equipped with four pairs of jolt/squeeze moulding machines and each of these has its own control panel, which enables a sequence of operations to

FIG. 14.—*Section of the "white" castings inspection department situated between the fettling section for as-cast components (Fig. 13) and the annealing department. All the castings are sorted into stillages for checking moulding output although they are later mixed when packing for annealing.*

Castings, Limited Expand

be pre-set and individual operations adjusted to suit particular patterns being used. The sand hoppers overhead are equipped with pneumatically-operated gates. The sequence of operation is therefore as follows:—To make the drag, the pattern is blown off and sprayed with parting fluid if necessary; the box is placed in position; the knee-switch pressed and the box overfilled with sand. Many patterns are of the short-run jobbing variety and on these during the first operation some hand tucking or ramming can be done if necessary—after the start button on the control panel is pressed. Jolting next commences; the head swings over, squeezing takes place and the head swings back; the pattern is vibrated and after a short period of slow strip, pins lift the box, which is then taken off and placed on the roller-track adjacent; the half mould is blown out, cored up by a third operator and pushed, being preceded by an empty box, to the forward machine. The cope is then made in exactly the same manner with the exception that rubber bowls are positioned on the squeeze-board which make contact with the rounded end of the downgate carried on the pattern. This connection is then "trued" with the finger, the mould is blown out, closed on to the drag half and pushed on to the pallet conveyor.

It may be of interest to record that when the drag half-mould is squeezed, the squeeze board overlaps the moulding box and sufficient sand is used to leave some "proud." It is this layer of sand which makes contact with the rollers and permits the mould to be slid on to the pallet conveyor without damage.

Rack accommodation for core storage for the moulds in production is positioned immediately adjacent to the particular roller-track section leading from the machines and the racks, in turn, are near to the main core-storage area. The moulding machines are so positioned that the majority of spillage sand falls through gratings on to the underground return-belt. Mould production varies between 70 to 100 moulds per pair of machines per hour, and it has been found necessary to employ an operator on the overhead walkaway to control the sand feed into the various moulders' hoppers. The average total output is from 2,000 to 2,500 moulds per eight-hour day and pre-planning of the output is used to indicate the number and spacing of the pig moulds necessary for any surplus metal arising from the present standard melt of 5,310 lb. of metal per hour. The maximum production so far is 2,542 moulds in a day. From a total weight of 16.4 lb. of metal poured per mould, 6.34 lb. represents good saleable castings production.

Sand Reclamation

At the knock-out, the hot sand, at the rate of some 14 tons per hour, falls through the grid on to an inclined belt (120 ft. per min.) which is also receiving about 10 to 12 tons per hour of spillage and overflow sand (newly prepared). The inclined belt then takes the sand under a magnetic separator, after which the sand falls into a hexagonal screen, where it is broken up and large lumps of used cores are rejected. A bucket elevator then picks up the sand from a discharge belt and takes it ultimately to fall on to a cross belt (also 120 ft. per min.) over

FIG. 15.—*Annealing section: (left) packing and stacking the cans and (right) discharge after annealing. Note the central grid for separating castings from packing material and the handling of cans with scissor-type grip and hoist and also by lift trucks of various types.*

FIG. 16.—*View showing final dressing of annealed castings on double-ended grinders in the foreground and with the batteries of Gibbons' batch-type oil-fired annealing furnaces in the background.*

the main storage-hopper, where various ploughs are employed in an effort to ensure an even distribution. As explained, this main hopper sits on two delivery belts and in practice it has been found best to operate both at the same time, discharging the sand into the continuous 30 tons per hour (model SB 3) mill. Over the mill are the belt feeds from two smaller hoppers (Fig. 8), one for coal-dust and the other for bentonite or similar clay-bond addition. The latter has not, as yet, been used and is installed only to cover a possible switch over to "synthetic" moulding sand at some later date.

Moisture is added to the sand at the continuous mill through sprinklers and passing a control valve and water-meter. "Speedy" moisture tests are taken every 20 min. and the water addition is manually adjusted to give the moisture range required in the sand at the moulding points. The sand continually discharges from the mill, *via* a short belt conveyor, into another bucket elevator and thence into a disintegrator and finally on to the belt supplying the moulders' hoppers. New-sand additions are made from a hopper with a rotating baseplate and adjustable plough feed on to the moulders' return spillage belt; such additions are always made under laboratory control.

As a final feature of this section of the review, dust extraction should be mentioned. Dust-laden air is withdrawn from the knock-out head, from the first inclined belt and from the hexagonal screen and is taken to a Rotoclone extraction unit, where the dust, converted to sludge, is thrown away.

Pouring and Knocking-out

Using 60-lb. capacity, red-sand-lined, suspended ladles, pouring is accomplished by four operators, three being actually engaged in pouring the moulds while one operates the tilting receiver. At regular intervals, each man takes a turn at the receiver, making a useful precaution against undue fatigue.

As the necked-in portion of the pallet conveyor for the moulds (see Fig. 1), one man clamps the (magnesium) moulding boxes prior to pouring and removes the clamps—on the other side—after pouring. The present speed of the conveyor is 14 ft. per min. and the moulds reach the knock-out approximately 10 min. after being poured. This knock-out is provided with a pneumatic pusher, manually controlled, and the selected box is pushed into the vibrating grid (Fig. 12), which has an air-extraction hood at the rear side. The box-parts are lifted off the grid and placed for return on a gravity roller-track running downwards to the moulding machines. The castings, heads and runners, are pulled off the grid on to an inclined shute and thence to the standard stillage which, when filled, is taken to the knock-off area by means of Yale & Towne hand lift-trucks, and positioned in the definite pattern (previously referred to). The knock-off area is provided with a series of booths (Fig. 13) each connected to an extraction unit and

it is in these booths that the runners and risers, etc. are knocked off and placed into stillages for return to the melting unit. All castings, whether good or bad, are sorted into their various types, also in stillages. These stillages are then transferred to the "white-castings" dressing section where they are lifted and the castings discharged into a Wheelabrator plant. After cleaning, castings are returned to the same stillage and trucked to the inspection area (Fig. 14). Here, castings are examined individually, scrap is segregated, the production is weighed and, finally, trucked into position at the filling station for the annealing section (Fig. 15).

Annealing Procedure

Reference has already been made to the design and principles involved in the batch-type oil-fired annealing ovens six of which have been installed in the Brownhills Foundry (Fig. 15). Each oven will accommodate 96 cans (packed with castings), arranged four wide, six deep and four high. Each tier of cans sits on a stool 6-in. high. The ovens are provided with lifting doors and by means of a Yale & Towne truck their contents can be discharged and replaced by a new charge in approximately three hours. The station for packing castings into cans for annealing is located crosswise in front of the first three ovens and cans are filled and stacked on stools under two runways, each equipped with electric hoists and scissor-type grabs. There is sufficient length allowed under the runways to accommodate a complete oven-full of cans and sufficient width to move the stacks over the track and to refill enough cans for a further oven. The cans are filled at the end of the runways adjacent to the inspection area and castings are mixed to achieve maximum packing density.

Each stillage of castings arriving from the "white-iron" inspection area has the weight and number of its contents recorded on a ticket; the collection of these tickets forms the basis for the oven records (so essential to efficient planning and progress). Two men are sufficient to cope with can filling.

With the excellent temperature-distribution and precise control available in the new annealing installation, any desired rate of heating can be achieved. Thus, a fast rate of heating is used until the castings reach 400 deg. C., followed by a slow rate of heating up to 600 deg. C., after which, 1,000 deg. C. is attained as soon as possible. In actual fact, some 30 hours are required to obtain the desired graphite-nodule distribution in the castings and to reach the operating temperature of 1,000 deg. C. This temperature is maintained for some 60 hours, after which, the oven is sealed and dampers are closed, resulting in a cooling rate through the critical range around 700 deg. C. of between two and three degrees per hour. The door is lifted when the oven temperature reaches 550 deg. C. When cold enough to handle after annealing is completed, cans of castings are removed in stacks from the oven and placed in a cooling area. Then, at an appropriate time, each stack is vibrated to remove scale and transferred by the fork-lift truck to the bottom shelf of the emptying-platform station (Fig. 15, right-hand illustration). An L-shaped runway, equipped with a turnover grab and electric hoist, permits the operator on the top platform to pick up each can and turn it over on to a vibrating grid. The castings are then sorted into types and placed in stillages adjacent.

Meanwhile, the annealing ore (which is used partly to decarburize the castings and partly to support them while at high temperatures) falls through the grid on to an inclined fine-mesh screen, from which the granular material retained passes to a standard stillage. Dust and powdered ore, passing through the fine grid, are collected in another stillage and are disposed of. (At a later date, empty cans will be placed on an inclined ramp to roll, by gravity, down to the filling station.) Extremely careful packing in the filling station, together with the use of the interlocking variety of annealing ore, has virtually eliminated distortion of castings during annealing and the resulting necessity for an expensive straightening section.

Annealing Control

Each oven is fitted with four thermocouples, one in the centre back top, one 18-in. from the burner quarl, one in the top centre and the fourth at the bottom front. The fuel used is CTF 100 (Creosote), fuel flow being controlled by a calibrated positive displacement type metering pump of the firm's own design. Urquhart burners are used and atomization is by primary-air supply from a single Reavell compressor. The secondary-air fans are equipped with Kent orifice-plates connected to Kent manometers. Differential pressure across the orifice plate is measured on the manometer and calibrated in cubic feet per minute. A "butterfly" damper, attached to a handwheel and a pointer on the attached rod, moves across a series of calibrations. An air-line from a point in the oven chimney (there is a separate chimney for each oven) below the damper, is connected to another manometer and gives a reliable indication of the positive pressure existing inside the furnace. By these means, any desired oil/air relationship can be achieved and reproduced at will. In practice, 140 cub. ft. of air per lb. of oil are used instead of the 167 cub. ft. theoretically necessary for perfect combustion. This reducing atmosphere, as mentioned before, substantially minimizes oxidation of the containers without loss of combustion efficiency. Apart from the early hours of firing, the stack pressure—or oven pressure—is maintained at a constant figure throughout the annealing cycle. This pressure is very important, as with the excellent temperature-distribution (referred to earlier), it is possible to maintain the correct overall soaking temperature with a fuel consumption as high as 10 gall. per hour, or as low as 2.2 gall. per hour, depending on the damper opening and the resulting pressure. Oil-, air- and damper-settings are under the control of the laboratory staff and not the individual firers and a precise

FIG. 17.—*Final shotblasting (model WTB.1 Wheelabrator), sorting and despatch of finished castings; castings are ultimately packed in bags for transit.*

sequence of operations is predicted and laid down for the latter's guidance (see Table 1).

Much thought has been given to the possibility of fully-automatic annealing-oven control, but as it is felt desirable to have a man on site during the whole of the annealing process, it also seems sensible to give that man something to do. Experience to date has proved it most economical to operate the annealing ovens as follows:—Three ovens are lighted on the Monday of each week and either two or three on the following Monday; this means the minimum of two firers need be employed—the "day" man working five days of twelve hours and the night man four nights of twelve hours. The oven cycle is so adjusted that all firing finishes before 7 p.m. on Friday and the use of the best-obtainable high-temperature insulation bricks in the oven construction has resulted in a sufficiently slow rate of cooling over the weekend—in the fully-sealed and closed damper ovens—that the ovens can be opened on a Monday morning and, if necessary, refilled and re-lighted on the same day.

TABLE 1.—*Instrument Data Recorded for Each Oven by the Annealer in Charge.*

Time (recorded at half-hourly intervals).	
Pump setting (oil flow), number and type of burner (different burner capacities are employed at different stages of the anneal from 12 to six, six to three, and three to zero gallons per hour).	
Kent oil-flow meter reading.	
Oil consumption in gallons per hour (calculated from the Kent meter).	
Main air supplied (cub. ft. per min.) taken at the main orifice.	
Injection air supplied (cub. ft. per min.) for atomization (from the Reavell compressor).	
Oil back-pressure, taken at the pump (lb. per sq. in.)	It is important to keep a constant pressure across the meter.
Ring-main oil pressure (lb. per sq. in.)	
Oil temperature (deg. F.) from tank into the ring-main.	
Oil temperature (deg. F.) from ring-main back to the tank.	
Damper setting and stack pressure (see text of article).	
Temperatures of oven at various locations are taken by the recording instrument (which can record up to 10 points).	

Physical Results

It is contended that only very rigid control of the basic metal composition, freedom from undesirable residual elements such as chromium, tin, arsenic, etc., coupled with the refinements obtained in oil burning and temperature distribution, enables this cycle of operations to be carried out.

The results ultimately obtained from this high degree of plant and process control mean that a material is cast direct from a cupola-furnace melt which, after annealing, consistently meets (and indeed exceeds) the physical properties laid down by the British Standards Institution for specification BSS.310, grade II, of the blackheart specification. Annealed castings after sorting are banked in a series of stillages in front of four double-ended Luke & Spencer grinders, Fig. 16, all equipped with the latest type of (BCIRA) dust-extraction units. Dressing and finishing of castings at the Brownhills works is on a piecework basis and (as previously described for the Walsall foundry) payment is based on the removal of ingate-metal volume, with certain other factors taken into account. After dressing, the castings are treated in a second wheelabrator plant, inspected, bagged, and arrive at the despatch department (Fig. 17) ready for shipping. In all this processing, the castings have then travelled some 600 ft. in a straight line from metal stockyard to despatch.

General Comment

The manning of a new foundry is, of course, all important and yet is a difficult problem to resolve as a works slowly build up to full production. The Brownhills works, however, is now fairly well established and a good idea of the manpower required for the existing set-up is available. Thus, at present, there is a total of about eighty, of whom twelve are supervisory, control or office staff and welfare employees. The balance is made up of two furnacemen, two chargers, and one labourer in the melting department; in the foundry, the eight men on the machines (and one shell moulder—see later) are engaged by a spare operator and serviced by one man engaged on mould clasping, another on the mill and one feeding sand, one corelayer, and three men at the knock-out, all under a chargehand. Seven men and a boy look after the "white-iron" knock-off, shotblasting and inspection section and four female operators and one man (for looking after the stove and for sand preparation) comprise the coreshop's complement. In the annealing section, two men are engaged on filling flasks and two on emptying plus one day annealer and one on night duty. Then, on final dressing, six grinders and one shotblaster are employed, with a further

Castings, Limited Expand

two on inspection and despatch. Finally, there are seven men and a boy in the patternshop and general services, canteen, etc., occupy six men, two women and a boy. Thus, for about the same output tonnage as the Walsall works and despite a considerably lighter average weight of casting, the Brownhills personnel total is lower by some 15 per cent.

A final verdict on the hot-blast cupola installation is that it pays handsomely on the metal side, but, probably due to the small size of the units, the fuel cost is higher than when using oil for melting. Metal loss at the cupolas spread over the first six-months' operation is 1.8 per cent. of the gross weight of metal charged. The annealing ovens—fired by oil—have also well proved themselves; it is estimated that twelve-months' operation of these will save £5,000 as compared with an equivalent coal-fired installation.

Not mentioned in the foregoing, but of interesting potentialities, is a small shell-moulding section which has recently been incorporated in the production scheme at Brownhills. This utilizes an FLCB two-station shell-moulding machine and a Polygram closer. Two half-biscuits, size 11½ by 15 in. are produced from one patternplate. So far, the plant has been confined to the production of small levers and "shoots" for the gas industry, but no doubt if it proves successful its application will be extended.

Acknowledgment

It has taken quite a lengthy account to record the data supplied by Mr. Hall and his colleagues concerning their Brownhills project, but the details are just the sort to be of real value to other foundrymen. Thus, the writer wishes to record full appreciation of the freedom with which these particulars have been made available and congratulate Castings, Limited, on the success attending their many novel developments. Especially valuable are the *pros* and *cons* freely discussed both before and after particular units of plant were adopted. They brought the sort of problems that must have given the planners many "headaches" but their analysis and elucidation here provide a new background to modern malleable practice for founders all over the world. If the writer has succeeded in capturing the crusading spirit which has permeated the whole undertaking at Brownhills, then the title of the article "Private Enterprise Goes Ahead" will be seen to be well justified.

Swedish Visitors

The Meltham factory of the David Brown companies was visited recently by a party of 22 agents from Sweden. Following the reception they watched a tractor field demonstration and later toured the machine shops and assembly line. They met Mr. David Brown, junr., general manager of the tractor division, at luncheon. On the following day the party visited a farm at Harrogate.

Film Review

Refining Nickel from the Sudbury Ores, produced for the International Nickel Company of Canada, Limited, by Film Graphics Incorporated, New York. It is in 16-mm., sound, colour and runs for 52 min. and is available on free loan on application to the Mond Nickel Company, Limited, Thames House, Millbank, London, S.W.1.

This is the third in the series of sound, colour films describing the nickel operations. The first told how the nickel is mined, the second how it is milled and smelted and the present film tells the story of how it is refined.

The refiner's problem is twofold: to separate out all other elements, leaving pure nickel, and to recover those other elements, of which there are 13, produced by the company, including the precious metals.

After a brief prologue, the nature of the Sudbury ore is explained and there is a quick résumé of the processes that led up to the production of the oxide sinter which is the nickel refiner's starting material. The principle of electrolytic refining is demonstrated and the preliminary processes of melting the sinter, cleaning the slag, and the casting of nickel anodes are shown. Then follows a detailed account of the theory of electrolytic refining, together with a description of the method used to purify the electrolyte and so prevent metals other than nickel depositing on the cathode. The actual process of electrolytic refining is then shown. The sequencies showing the purification of the electrolyte lead into a brief account of the electrolytic refining of cobalt. The recovery of the nickel from the special alloy containing precious metals, made during the smelting operation, is shown.

The Mond carbonyl process of refining nickel is described, first by a laboratory demonstration of the nickel carbonyl reaction and then by sequences that show the actual plant, together with animations to illustrate the way each unit operates. The pressure carbonyl process for the production of nickel powder is described in detail. Finally, the chemical treatment applied to the residue from the carbonyl refining is briefly illustrated to show how the copper, cobalt and residual nickel contained therein are turned into useful chemical salts and oxides.

The film tells its story with admirable clarity, much aided by clever animations and well-delivered commentary. However, it really needs more than one viewing in order to assimilate the considerable amount of information packed into just under an hour's running time.

Raw Material Prices Hold

June was the first month since the spring of last year in which prices of basic materials (excluding fuel) rose in the UK. The Board of Trade's provisional index for the month shows a rise of 0.4 per cent., mainly because of the recovery in copper prices. The 9 per cent. rise in copper prices and the slight increases in lead and zinc prices gave a slight upward stimulus to the indices for materials used in the mechanical engineering and electrical machinery industries. They rose by 0.4 and 0.6 per cent., respectively.

Prices of manufactured products (other than fuel, food, and tobacco) were unchanged in June after falling every month since January. Non-ferrous metal manufactures were dearer so that, for the most part, changes in June were attributable to the strength of the market in non-ferrous metals (other than tin). Prices of fuel used in manufacturing industry were fractionally lower, chiefly because of cuts during the month in fuel-oil prices.

Equipment & Supplies

Diaphragm Moulding

Considerable interest has been aroused among British founders in the potentialities of a process of pressure moulding developed in the United States, known as diaphragm moulding, using equipment marketed under the trade mark "Taccone"—the name of its American designer. Largely because of the import system, as far as is known no such equipment has made its appearance in the United Kingdom, although Taccone machines are used in various Continental countries and were, in fact, demonstrated at the Düsseldorf Foundry Exhibition, in 1956. Recently, however, an agreement has been concluded confirming acquisition of UK selling rights for the Taccone machines by the foundry plant division of Baker Perkins, Limited, and importation is about to commence. First, the installation of a small plant will be made in that firm's own experimental and demonstration bay at their Newcastle-upon-Tyne works and subsequently, supplies will be made of American-built machines as a preliminary to the manufacture in this country to Taccone designs.

It is therefore opportune that an independent report on the operational characteristics of these machines should be made available to founders in the UK—and throughout the world—through the medium of this JOURNAL. With this in view, a member of the editorial staff accepted earlier this year invitations from two French foundry concerns using Taccone equipment to visit their works to gain first-hand information. The visits were most instructive; the French hosts made working data freely available and the report and illustrations which now follow are based on the direct observations recorded. So far as is known, although accounts of some aspects of diaphragm moulding have appeared previously in contemporary journals, and the claims made in those accounts might advantageously be referred to by readers—this is the first report to be printed which is independent and refers directly to practical working of the machines in the field.

Basic Process

The name "diaphragm moulding" stems from the use of a loose rubber-bag or diaphragm attached to the upper platen of the Taccone moulding unit. In use, this is inflated (from the works existing compressed-air supply) in such a way as to compress sand and form a mould when a patternplate and box-part charged with loose sand is positioned beneath it. The high degree of compression of the moulding sand around the pattern caused by the air entering the bag at pressures of between 80 and 100-lb. per sq. in. forces the top surface of the mould to assume roughly the same contour as the patternplate; hence "contour moulding" is another term sometimes used to describe the process.

No jolting of the patternplate or squeezing by the machine platen is applied. The sand is consolidated solely by air pressure, it being claimed that in this respect more-uniform mould-hardness in the body of the mould results. This is ascribed to the fact that

FIGS. 1 AND 2.—*Two small diaphragm-moulding machines arranged back to back at the Durenne foundry and used in conjunction with the floor-bank system of moulding for producing gearbox castings for the Peugeot motor-car. In Fig.* 1 *(a close-up of one of the machines), the gearbox half-pattern is clearly shown and Fig.* 2, *of the twin machine, includes the control pulpit and the compressed-air reservoir.*

KEY: (A) Pedestal and pattern-stool; (B) blowing head; (C) rubber diaphragm; (D) moulding box; (E) upset frame; (F) pedestal (for the three control valves); (G) bar-lift stripper, and (H) compressed-air surge-tank.

sand flow takes place in any direction until resistance against the pattern, patternplate or box-part is encountered. This is the difference in principle between diaphragm and jolt/squeeze moulding. Jolting, by the very nature of things, preferentially compresses the sand which is closest to the pattern. Squeezing a mould from above, by means of a flat platen, tends to consolidate its top surface and give high mould-hardness at parts of a pattern close to that surface, possibly at the expense of portions of the pattern lower down. Both jolting and squeezing in a vertical direction during a moulding operation thus tend to compress the sand mostly at horizontal planes and logically, therefore, these methods would seem best suited for the production of flattish types of castings. On the other hand, diaphragm-moulding machines, by reason of multi-directional application of the ramming force upon the sand, would seem to suit moulds for semi-cylindrical castings (such as pipes and pipe-specials) and those with quite deep vertical or near vertical walls (box-like shapes, cylinder-blocks, etc.).

The writer travelled to France forearmed with these basic conceptions of diaphragm moulding and also the knowledge that, for small sizes, Taccone machines were about three times as expensive in first cost as conventional jolt/squeeze machines, although nearer parity in price was being claimed for large machines. He also had the notion that special sands and binders were being recommended for diaphragm moulding and ordinary rolled-steel moulding boxes were insufficiently robust to withstand subjection to the high bursting stresses of the process.

Durenne Foundry

Using Paris as a base, a visit was paid to the foundries of Ets. Metallurgiques A. Durenne at Wassy near St. Dizier. This is an iron foundry catering for general-engineering castings—in short, for medium runs—and thus not at present extensively mechanized, although moulding machines and an impeller-type ramming machine have been in use for some time. Here, there are installed two small Taccone machines, back to back, making matching half-moulds in snap-flasks for subsequent floor-bank assembly and jacketing *in situ* for pouring. The installation, which is now in its third year of operation, is shown in Figs. 1 and 2, the salient features of the machines being as follow: Type TD 5 machines; box-part size 12 by 18 in., depth 12 in. max., using 1.5 cub. ft. of air per cycle. The timing can be by hand or entirely automatic for one cycle or yet for repetitive cycles throughout the day's working. Maintenance was reported to be low and the diaphragm (easily replaceable) was quoted as giving between 60,000 and 80,000 moulds before a new one was required.

Machine Essentials

A study of this relatively small layout served to amplify the original conception of diaphragm moulding, outlined earlier, to permit a realization of what are the fundamental machine components and the basic operational cycle. It is clear that in its simplest form, the set-up for diaphragm moulding (as, in fact, it exists at the Durenne foundry) consists of a substantially constructed and robust machine arrangement of duplex nature. The two major components are a pedestal and pattern-stool (Fig. 1, A) (the latter adjustable for differing depths of patterns) and a blowing head, B, integral with it, carrying the loose-fitting rubber diaphragm, C, mounted in a frame (and drawn up out of sight by suction when not in use). On the pedestal, the patternplate is made ready for moulding by the putting on of the moulding box, D, the addition of an upset frame, E (about which more later), and a loose filling of moulding sand.

Operational Sequence

In the moulding operational sequence, the patternplate assembly is traversed on its guide rails to a new position under the blowing head, by means of the opening of a valve at F. A second valve is next opened to bring about admittance of air in a rapid surge to the diaphragm and the sand is compressed against the pattern in a matter of about two seconds (for the squeezing cycle itself), such movement being followed by suction withdrawal of the pressure bag and the return of the patternplate and mould to the forward stool. Finally, after the removal of the upset frame, a third control is operated to bring into use a quite conventional bar-lift stripping arrangement, G, and the mould half is ready for removal.

During the pressure application, the sand is compressed to about two-thirds of its original volume and hence the need of the upset frame above the moulding-box proper—first, to accommodate the loose sand, second, to provide a seal for the diaphragm and, third, to leave—after removal—a sand face standing "proud" above the box edge. It is also apparent that this upset takes the majority of the bursting stress during moulding and thus the fear that very heavy duty box-parts are a necessary adjunct of the process is to a large extent unfounded.

Box-parts, particularly large ones, do need careful designing to give some extra rigidity and strength for diaphragm moulding, but on the machines in the Durenne foundry, magnesium-alloy snap-flasks were in use on the Taccone machines, and these (made by Abco, of Paris) seemed to be of quite normal section and design. (It was in fact interesting to find quite large snap-flasks and jackets of this make in extensive use in these foundries, for example, for moulds up to one-metre cube, and such flasks are even applied for impeller-rammed moulds.) A further essential feature of diaphragm moulding not hitherto mentioned is the provision of a compressed-air surge tank (Fig. 1, H) adjacent to each machine, to provide an adequate backing of air for the diaphragm operation.

On-the-spot Observations

At the Durenne foundry, the pair of Taccone machines were being used, *inter alia*, for making matching half-moulds for gearbox castings for Peugeot motor-cars (Fig. 3). (The works staff here confirmed the statement that so impressed was the customer with the quality of the castings supplied that more orders for this component were being passed to the Wassy foundry.) After withdrawal from the machines, these gearbox moulds are cored-up, assembled, jacketed and floor-banked close by, for pouring.

The hardness of the moulds being produced here was fairly consistent (at about 80 to 85 AFS units) whether on horizontal or vertical faces, despite the fact that sand of somewhat variable composition was being employed (see later). Clean "strips" were obtained, but it was explained that no latitude in pattern construction—which might result in undercuts—can be permitted. Thus, whereas with jolt/squeeze moulding, the action is such that slight undercuts can sometimes be "got away with," this type of pattern is unworkable on the Taccone machine. Nevertheless, Mr. de Chatelus, director general of the Durenne con-

cern (who speaks English fluently) assured the writer that wooden patterns could well be used on these machines and indeed pattern life generally was better than with other types. Pressed to explain his reasons for his avowed intention to extend diaphragm moulding in his foundry despite the much higher initial machine cost, he said the three main advantages over his previous practice were (1) reduced maintenance; (2) the machines were less tiring to operators (mainly deriving from the small amount of noise), and (3) wooden patterns could be used. In the case of the Peugeot gearboxes, good accuracy was being secured, along with a weight saving over the previous method of moulding from the same patterns. Short runs, of as few as 200 to 300 castings off a pattern could be produced on the machines from cheap wooden patterns and this had been the primary factor in persuading the firm to adopt the diaphragm method. Absence of any foundations for the machines or their control pedestals meant that they could be moved to a new site in the foundry as required—a valuable feature for jobbing work.

Extensions in Progress

At present in process of construction at the Durenne foundry is a mechanized production layout to which the small Taccone machines are eventually to be transferred. Awaiting incorporation in this same scheme there is already in stock a new model TD 52 (24 by 24 in.) diaphragm-moulding machine, actually capable of making moulds of size up to 30 by 30 in. at the rate of 250 half-moulds per hour.

Société Generale de Centrifugation

During the same day, a visit was paid to the foundry at Bar-le-Duc of Société Generale de Centrifugation, where, as the name suggests, centrifugal casting (on the de-Lavaud principle) is used for producing iron pipes. In an auxiliary foundry, however, many pipe-specials—elbows, tees, jointing flanges, fittings, etc., are produced and it is here that a mechanized plant has recently been commissioned to incorporate a model TD.72 Taccone machine. This, in strong contrast to the Durenne foundry, provides an example of diaphragm moulding adapted to an ultra-modern set-up, and allied to a high degree of automation. Naturally, it has posed many new problems, but it also brings out well the claim of the designers that Taccone moulding is a whole system, not merely a single machine. The mechanized installation at Bar-le-Duc has been engineered by the firm's own staff and much credit must go to them for a bold conception, containing many original ideas splendidly executed.

Production Unit

The plant at Bar-le-Duc is variously illustrated in Figs. 4 and 5, Fig. 4 being a schematic layout drawing made available to the writer by the firm and which renders further description almost unnecessary—at least for discerning foundrymen. The TD.72 diaphragm production unit (Fig. 4A) has the following specification and capacity: Type TD.72 taking moulding boxes 24 by 36 in. to a maximum box depth of 24 in. For a mould 9-in. deep approx. 4.5 cub. ft. of free air is required per cycle.

Operational Sequence

Briefly, the numerical sequence of operations of the "Centrifugation" foundry scheme is as follows:

The cycle of automatic or manually controlled operations is set in motion at the control pulpit (Fig. 4C); (1) the upset frame, D, is mechanically lowered over the patternplate for the bottom half of the mould, which already carries a moulding box; (2) a pre-determined volume of mixed sand is delivered from the hopper dispensing mechanism, B; (3) the assembly is pushed under the diaphragm head, A, and the mould is made; it is then returned to its original station; the upset lifts and the mould is stripped from the pattern; (4) a similar sequence is carried out for making a top half-mould—delivered on the longer conveyor leg. In operation (5) at E, the bottom half-mould is turned over and automatically strickled from below, surplus sand being returned to the reclamation plant on belt, T_1 (6), cores are placed in the bottom half-mould, and (7) this half is lowered by the device, G, and traversed sideways to pass below the conveyor carrying the top half-mould. In the meantime, this latter half of the mould has had its face-top strickled and its pre-formed runner-cup chamfered by devices at H (the surplus sand being returned on belt, T_1). In operation (8), by a mechanism at I, the two mould halves are mated and pass to J, where a device lowers them, (9), to rest on a pallet delivered along chute, N, and to proceed along the conveyor to K, which is a turntable for transferring assembled moulds to a pallet conveyor. The next operation, (10), is pouring, which can either be done directly (and automatically through a tundish arrangement as sketched) or bank storage and subsequent transfer for pouring can be selected. Cooling, (11), takes place under the fume-extracted hood, L, and cast moulds are returned to the head of chute, N, where knocking-out, operation (12) takes place at O, and P, the castings being taken away in stillages, and sand being returned for reconditioning. At Q,

FIG. 3.—*Final inspection of Peugeot gearbox castings preparatory to despatch from the Durenne foundry. On the left is a stack of larger castings of similar type.*

the box-parts are separated (13) and re-routed to bottom- and top-box magazines, R, and S, respectively, ready for recommencement of the cycle.

Observations

The plant is very compact, very robust and though at first minor "teething troubles" had to be eliminated, it is obvious that its designers are well satisfied with the potential output. From a manning of twelve for the whole plant (including pouring and knocking-out) 80 to 100 boxes—at least—per hour were being cast of size 24 by 36 by 5 in. each part (a 4-in. deep upset was being employed). Typical patterns produced here include quite large pipe fittings (elbows, tees and flanges) and short pipes, up to about 8-in. dia. The writer was led to understand that on the new plant, castings from a given pattern weigh less than when other methods of moulding are employed, as there is significantly better uniformity of section thickness. The designers claim that with diaphragm moulding, the time taken by the pressure squeeze for quite large box sizes is less than with any other method of mould production and hence, ancillary operations can be geared to this high speed. It is significant that a further machine to take even larger boxes (36 by 48 by 10 or 14 in.) is being installed.

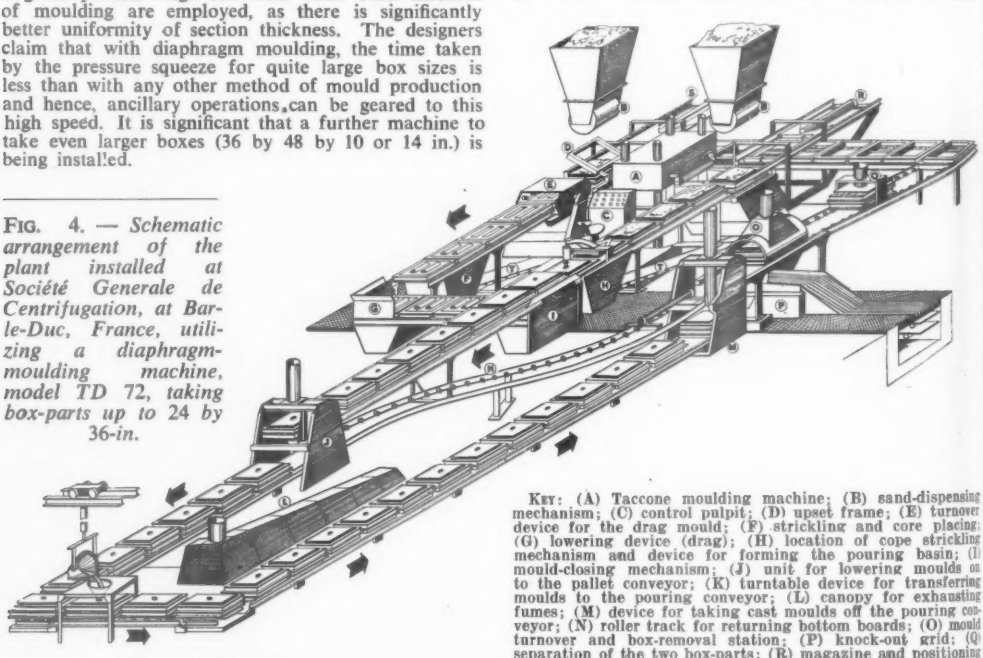


FIG. 4. — *Schematic arrangement of the plant installed at Société Generale de Centrifugation, at Bar-le-Duc, France, utilizing a diaphragm-moulding machine, model TD 72, taking box-parts up to 24 by 36-in.*

KEY: (A) Taccone moulding machine; (B) sand-dispensing mechanism; (C) control pulpit; (D) upset frame; (E) turnover device for the drag mould; (F) strickling and core placing; (G) lowering device (drag); (H) location of cope strickling mechanism and device for forming the pouring basin; (I) mould-closing mechanism; (J) unit for lowering moulds on to the pallet conveyor; (K) turntable device for transferring moulds to the pouring conveyor; (L) canopy for exhausting fumes; (M) device for taking cast moulds off the pouring conveyor; (N) roller track for returning bottom boards; (O) mould turnover and box-removal station; (P) knock-out grid; (Q) separation of the two box-parts; (R) magazine and positioning device for cope box-parts, and (S) similar mechanism for drag boxes; (T) sand-spillage belts.

Sand Quality

To get optimum results from diaphragm moulding, the machine makers recommend quite unusual sand properties, although at both plants inspected, quite ordinary system sands were at the time proving quite satisfactory. However, at the Bar-le-Duc installation, the following sand properties are aimed at: Fineness—90 AFS; green-strength—17 to 18 lb. per sq. in.; permeability No.—100 to 120; clay content—12 to 14 per cent (including about 1.5 per cent. bentonite) and moisture—5 per cent. This, readers will appreciate, is a very strong tough sand with a moisture well below that normally required to develop full bond. Nevertheless, its flowability at high pressure is said to be good and the mould-hardness throughout is excellent. If specimens be trepanned from a finished mould, it is claimed that the permeability is higher than the standard AFS test on the same sand would indicate—this stemming from the fact that during mould production, air originally trapped between sand faces and diaphragm is forced through the mould to escape at the pattern-plate surface, thus venting the mould.

Other Details

It is regarded as important at this plant that all possible steps should be taken to avoid sand spillage at the dispensers, as this can prevent proper automatic closing of the upset frame. Heating of the patternplate helps in getting a clean strip for difficult patterns; patternplate changing takes about 10 min. at a maximum—as there is no jolting, rapid-fixing devices can be adopted for securing patterns to the plates and patternplates to the machines. The patternplates need be no stronger for diaphragm moulding than for other types of machines, but it is doubly necessary for them to seat flat on the pattern-stool. A pattern draft of 1 per cent. is recommended and it is essential to have some draft, however little this may be. Box-bars are said to need careful design, and in the plant inspected, round bars (Fig. 4) were employed. (Literature published about each plant mentions the possible use of chains instead of box-bars).

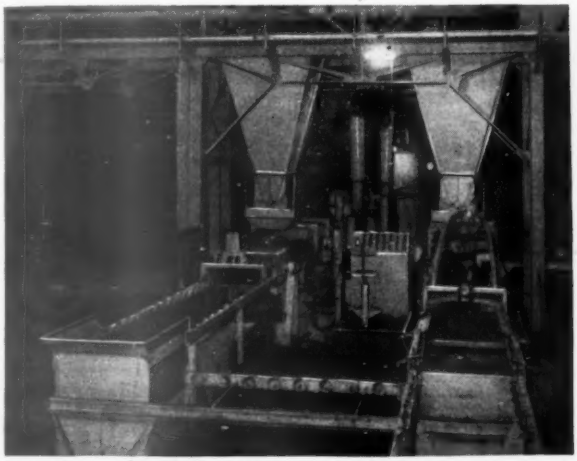
The concensus of opinion at the Bar-le-Duc plant was that it is easier to produce good castings from awkward patterns with contour moulding and that even a poor sand gives a fair surface finish on the casting. A present tendency is to combine two or more smaller patternplates in one or produce large multiple-impression plates on large machines, which can be used with the same celerity as small ones. One drawback reported is the necessity of arranging a somewhat greater margin between individual patterns and the edge of

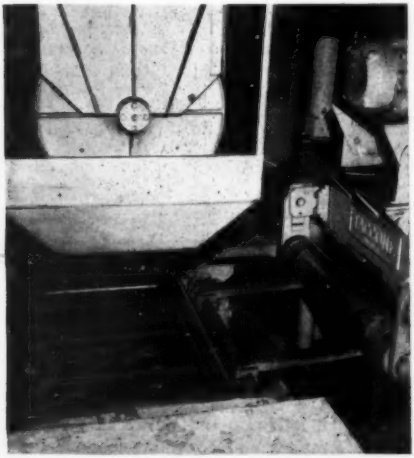
the patternplate when designing for diaphragm moulding. This is naturally more pronounced when moulding box-like castings and derives from the natural reluctance of the diaphragm to penetrate deep pockets at the edges of the mould, where the box part represents an unyielding edge.

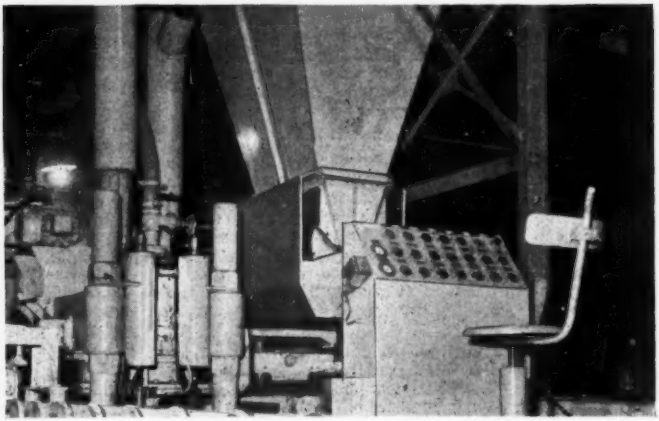
General Comment

The writer's thanks are recorded in full measure to the French foundrymen who have made this report possible and who have so freely given facilities for questioning their staff, taking particulars of moulds and machines and photographing their plant. It remains for readers to assess the final picture: plant diaphragm moulding put yet another tool in the founders' hands in their endeavour to produce better castings for the engineer at a more economical price? No readymade answer can be forthcoming; many factors must needs be assessed—some peculiar to each manufacturing set-up and many of them certainly outside the ken of the present writer. However, an attempt has been made here to present a fair picture of the development without prejudice. If the writer himself has lost his earlier qualms on the score of box-part strength and the necessity for special sand, nothing has been said to indicate that a Taccone installation is cheap in first cost. Maybe the French founders were enthusiastic because they themselves have chosen to make their plants work and work well, but against this it can be argued that they —like the writer—have "no axe to grind" in making their comments. The mention of repeat orders for similar plant is in itself eloquent testimony. At least, the way has now been cleared for founders to assess just what the new process means and to visualize its adaption to each individual set-up.

FIG. 5.—*Other views of the Bar-le-Duc diaphragm-moulding plant and the mechanization scheme associated with it: (top left) general view showing the two mould-delivery conveyors and hand hoppers with the Taccone machine between; (top right) close-up of one of the sand dispensers with a box-part (note the round-section bars) and pattern below; (bottom left) control pulpit—right; sand hopper—centre, and machine—left, with mould-delivery rollers in the foreground, and (bottom right) the machine pressure-head.*







Equipment and Supplies

Cold Casting Filler

Having received from M. G. Plastics Sales, 9, South Molton Street, London, W.1, a sample of Metolux—a material for filling blowholes and the like—it was sent to a well-known foundry manager for independent practical testing and the following are extracts from his report:—

"We have tried the material out very successfully on cast iron in the following instances:—(1) A shrinkage cavity appearing in the bore of a casting was filled with Metolux material and was afterwards found to be almost indiscernible from the parent metal. (2) A sand inclusion had occurred on a plate face where a tapped hole was required. With the customer's permission, this was cleaned and filled with the new material and later drilled and tapped to the customer's entire satisfaction as to pressure tightness, etc. (3) A surface defect appeared on machining a casting, due to a slag inclusion. This was cut out and filled and later surface ground to the customer's satisfaction. (4) Sand inclusions in the corner of a bracket were again cut out and filled in and filed to suit the contour. We are now about to try the sample of aluminium powder also submitted on a casting which, on machining, has shown sand wash from the runner and we feel confident of success."

The report, from which a quotation is reproduced, stresses the desirability of founders co-operating in every case with the customer, *i.e.*, the filling material should not be used to camouflage defects. A suggestion is made by the suppliers that the material can be used also for mending or altering metal patterns.

Cut-price Soviet Aluminium Causes Concern

Concern about the disruptive tactics of Soviet interests in the economic field, particularly with regard to aluminium, was voiced by Lord Alexander at a meeting in Montreal of Aluminium, Limited. Lord Alexander is a member of the board and chairman of the UK subsidiary, Northern Aluminium Company, Limited. Both companies, he said, had been seriously affected in the past year by the entry of cut-price Soviet aluminium into UK and European markets.

The Russians had continued to undercut prices for Canadian aluminium ingot and products fabricated from it since Aluminium reduced its ingot price last April. The problem was one which would have to be handled at the highest level and posed questions of trade dumping and the application of such counter-measures as import quotas and anti-dumping tariff rates.

Drop in Machine-tool Orders

Latest figures for orders published by the Machine Tool Trades Association show that orders fell again in April and less work was outstanding at the end of the month. During April new orders valued at £5,200,000 were received, a drop of £1,200,000 on those received in March and of £1,300,000 on April, 1957. Most of the fall is due to lower export orders. Deliveries in April fell to £6,600,000 as a result of the Easter holidays, but the order-book fell by £2,000,000 to £68,600,000.

In contrast to export orders, home demand has held up well, the value of home orders booked so far this year being only £1,800,00 less than for the similar period in 1957.

Law Cases

Sheffield Appeal Succeeds

An appeal by General Refractories, Limited, Sheffield, was allowed with costs in the Court of Appeal. The appeal was from a judgment of Mr. Justice Jones ordering the company to pay £756 damages to an employee, Mr. George Duncan Nixon, a maintenance fitter, who suffered injuries while in its employ. The judgment was set aside.

Lord Justice Hodson said that Mr. Nixon was helping to re-line the inside of a stone-crushing machine with zinc or white metal when there was a "blow back" and he suffered severe burns to the face and one eye.

He had made a number of allegations of negligence, but only succeeded in one respect. The judge held that the eye goggles his employers provided did not afford reasonable protection from being splashed by molten metal.

The company had denied allegations of negligence and breach of duty and Lord Justice Hodson said that in his view the trial judge had come to a conclusion that was not justified on the evidence. This showed that the goggles provided at the time of the accident in 1955 were the best that could be reasonably provided. Improvements had since been made.

In his lordship's view Mr. Justice Jones had correctly decided all other allegations of negligence against the employers and the appeal succeeded on the one issue regarding goggles. Lords Justice Morris and Sellers agreed in allowing the appeal.

Employers Not at Fault

Claim for damages for injuries sustained at work failed at Staffordshire Assizes before Mr. Justice Stable, who described the accident as "the most overwhelming bad luck." The plaintiff was Mr. Harold Leopold Wilson (29), a moulder, and he sued Thos. Dudley, Limited, ironfounders, hardware manufacturers, etc., of Dudley (Worcs).

It was stated that when Mr. Wilson was knocking out a mould at work, a piece of metal from a casting flew up and struck his eye. He sustained laceration to the right cornea, lost his telescopic vision and now, when he looked at anything bright, his vision became blurred.

In his judgment, Mr. Justice Stable said there was no evidence that the casting from which the fragment of metal was supposed to have come was defective at all. He could not find the employers at fault and the claim failed.

Signal Not Given

For the loss of the tip of his index finger in an accident in a Tipton foundry, Mr. Iziah Hopson (42), a moulder, was awarded £469 damages by Mr. Justice Stable at Staffordshire Assizes. Mr. Hopson brought his action against Coneygre Foundry, Limited, alleging that a crane driver had started to hoist a pattern plate without receiving a signal and before the plaintiff could take his finger away from the shackle.

The crane driver, Mr. William Mills, said the shackle had been fixed and the hook inserted. He was given the signal to hoist and took the weight, but there was a shout for him to lower.

"I have come to the conclusion that in this particular case I do not think the signal was given to the crane driver," said the judge.

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Technical Sessions at Gleneagles and Falkirk

(*Continued from page* 117)

The first technical session of the annual conference of the Institute of Vitreous Enamellers, held in Scotland, occupied the late morning of June 16, in the ballroom at the Gleneagles Hotel. Mr. W. T. Wren, the new president, was in the chair with Mr. J. H. Gray also on the platform, and approximately 40 members were present to hear Mr. C. S. Beers' paper on "Works Management and Human Relations." Mr. Beers is works director of Leisure Kitchen Equipment, Limited (one of the Allied Ironfounders group of companies) and thus spoke on first-hand practical experience. Mr. Beers said that the method of payment in a vitreous-enamelling department was very important and should have a very big bearing upon the quality of the finished ware produced. As an illustration, he described the method adopted for payment in his vitreous-enamelling shop, where those employed worked hard to earn good wages and salaries. "Leisure was only sweet when it followed work well done," he felt, explained the principle more clearly.

Everyone in the enamelling department of his firm, including mill-room and pickling-room personnel and all those responsible for both operating and running this department, worked as a team and all monies earned over and above the basic wages were equally shared by all, in relation to number of hours they had worked. This was because it was considered that all engaged or employed in this department were absolutely necessary to maintain the production ware of the highest possible quality. As such they should enjoy equal shares for their efforts in the form of a bonus.

The basic wage was looked upon as being equal to a specific output of good ware passed by inspection and was measured in terms of number of sq. ft. produced per man/hr. All good ware produced and passed by final inspection over and above the basic amount was credited for bonus purposes and by this means, it would be appreciated that the controlling factor in relation to the bonus earned, was not only quantity, but also quality. By this principle, it was essential for each individual in the team to see that his part of the job was well done.

Continuing, Mr. Beers stressed his view that management's job in the works was to take under their wing all phases of day-to-day control, personnel welfare, trade-union co-operation, etc.—in short, they must *manage* and could not properly delegate any of these responsibilities to others. He concluded by stressing the value of executives approaching employees in a constructive manner and enlisting their help, while explaining the objectives sought. For example, if a foreman addressing a workman said: "Here you, stop what you are doing and come over here, get a dozen of these finished off quick"—the man does the job, but doesn't like it and feels he is being pushed around. If, instead, the foreman said: "Bill, we've got an urgent call for some of these. Can you get me a dozen finished by 4 o'clock?"—the man was much more likely to feel he was being put on his mettle and trusted to put forward his best effort.

Prof. Dr. Miguel Amat from Barcelona University (left) seeks information from the IVE secretary, Mr. J. D. Gardom, after one of the technical sessions.

Bonus System

Questions during the discussion of this paper mainly concerned the incentive bonus outlined by the Author. Were maintenance men included, one member wanted to know, the reply in this case being that they were not, but that there were bonus systems for all productive departments, based on good ware leaving the works. A works committee was not considered necessary, said Mr. Beers, replying to another question—fundamental changes in works procedures were explained in advance to the shop steward but he was not expected to do anything about it; the management's job was to issue all instructions and give any necessary advice and instruction. Asked how a group bonus scheme could reconcile the varying difficulties of jobs, the

* A commentary on the business meeting, chairman's report, president's address and social events of the conference was printed in the JOURNAL, July 24.

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Author said this was partly covered by rate differentials of skilled /unskilled men. He considered a bonus should never be paid to some sections despite bad work by others, only good (saleable) work should be paid for. No "suggestion boxes" were included in his scheme, but freedom of discussion between men and executives was encouraged, which he thought was a nicer way of bringing forward ideas. Explaining further in reply to a challenge that a bonus scheme was merely a method of giving more wages, Mr. Beers said his bonus was related to quality more than quantity and the shops provided their own inspectors. When challenged that technical men did not make good foremen, he asserted that he had not stated in the paper that a foreman should be a technician, what he had said was that a foreman's ability to deal with labour and problems arising on the job was in proportion to his technical knowledge of the process operated. Pressed to give a figure for the actual bonus paid to employees as a percentage of their earnings, he said that this depended on output, quality and quantity, and hours worked; less than 75 per cent. was useless, more often than not it was in the region of 150. Concluding his remarks, he stressed the value of almost daily meetings between management executives.

Wear and Tear of Enamels

Technical sessions II and III took place on the Monday afternoon, also at Gleneagles. The first comprised a paper by Mr. J. W. G. Pedder (of Escol Products, Limited) on "Wear and Tear of Enamelled Surfaces" and the second, a review by Mr. Lloyd Manuel on "Properties and Applications of Flame-sprayed Refractory Coatings." Both papers were discussed separately.

Introducing his paper, Mr. Pedder said that of the two major qualities of enamels, the chemical side had been stressed in recent years and physical properties had been taken too much for granted. A fundamental enamel property, for example, was adhesion; without this property, even an acid-resistant, alkali-resistant and diamond-hard enamel was useless. Some other properties were fairly well defined, but abrasion and wear-and-tear resistance were not and these had to be considered in relation to service applications. For example, as soon as the vitreous enamelling of cast iron progressed from sanitary appliances to shop-fittings and scale parts, about 30 to 40 years ago, the first question was "How does this finish stand up to scratching by a butcher's knife or any other trade-counter service requirements." Then there was the question of cleaning and resistance. especially to abrasive powders. It could be put forward that a primary quality requiring measurement was an enamel resistant to scraping.

At this point, Mr. Pedder outlined a number of earlier research references and findings on the subject of scratch-hardness tests, etc., and continued by describing in detail a number of experiments he had conducted himself, first testing scratch-resistance and later abrasion-resistance. A series of results was quoted for when a pyramidical diamond was drawn across the specimen and traversed at a velocity of 3 cm. per sec. while loaded to 522 gm. by weights placed on a brass platform. It appeared that: (1) Scratches on cast-iron enamels were interrupted and had ragged edges; (2) scratches on sheet-iron enamels were almost continuous but had ragged edges; (3) scratches on glass samples were of the resemblance of a cut and had parallel sides; (4) scratches on enamels were of the nature of a crushing or tearing of the edges, and (5) there was a tendency for the scratches on enamels to widen on standing, through flaking off from the ruptured top skin of the enamel. This also tended to make the scratches more irregular. From the above results, it was considered doubtful whether slight differences of hardness could be determined, especially in the case of softer enamels where the scratch was of such a ragged nature.

Tests with Blade-shaped Diamond

A second series of experiments was made using a loud-tone gramophone needle for scratching instead of the diamond, but these had inconsistent results and the method was discarded. The third series of scratch tests with a blade-shaped diamond instead of a pyramid shape had proved much more useful. Using a load of 722 gm. the Author recorded a number of results produced for various types of enamel. The test produced on the enamel a distinctive scratch according to type and the surface of each enamel broke in a characteristic fashion, *i.e.*, a continuous deep cut flanked on either side by roughly rectangular areas, something like a series of "balloons," thought to be cracked or crushed enamel. In order to make the necessary measurements, the "balloons" were measured at their widest points and the average recorded. It was known that a titania-based acid-resistant enamel, sample (M), could not be scratched by hand with a sharp steel blade; an acid-resisting non-titanium enamel, (N) hardly at all, and an antimony-opacified cover coat scratched readily, and the results of the blade-shaped diamond test-scratch were in accordance with this classification. This could be seen more clearly if the average width of the "balloons" was calculated in units—one unit to equal 0.125 gm., hence, enamel M: 1.104; N: 1.493 and O: 1.327. Whilst this method of evaluation of the resistance of enamel to scratch would include differences of a sufficiently small order to be useful in development work, it could not be used as a basis for standardization. The careful descriptions required in interpreting the results and the extreme improbability of getting uniformity of technique would not enable anyone other than a skilled technician to use the apparatus.

Abrasion

Next, the Author described a number of tests using an apparatus to measure the loss in weight of an enamelled specimen when subjected to abrasion by the impingement of a charge of steel grit. Experiments were made to determine the amount of grit to be used and the angle of inci-

At the first technical session, Mr. C. S. Beers (left) of Leisure Kitchen Equipment, Limited, addressed the delegates on the subject of "Works Management and Human Relations." The second illustration shows a section of the audience at one of the other sessions.

dence of impingement—eventually 8- and 20-lb. charges were used at about 45 deg.—and several sequences of results on various types of enamels were recorded. Other trials were made to try to determine the minimum amount of grit required to disrupt an enamel surface. It was clear from the results that there were two stages in the destruction of a vitreous-enamelled surface—(*a*) resistance of the top skin followed by (*b*) abrasion of the sub-surface layer.

The question of abrasion, the Author said, opened up a very wide field of research into the surface conditions of vitreous enamels. Once the top skin of the enamel was broken, a number of new conditions arose. First, the surface tension of the enamel was altered; enamelled components did not get the long annealing treatment to which glassware, for instance, was subjected to relieve as many strains and stresses as possible, and lack of anneal was much evident in the case of soft enamels. If a runner from a frit kiln when being tapped was tested, it would be found that it was practically acid proof, but the same enamel when ground and fired was the reverse.

The latent energy present in glass that had been rapidly cooled was well known and this could be demonstrated with "Prince Rupert" drops (which Mr. Pedder showed at this point). The standardization of any apparatus to give results that would determine whether an enamel is acceptable from an abrasion-resistance point of view or not, required a great deal of attention, he concluded. One big problem would be the selection of a base material with which to compare enamels. From his results it did not appear that plate glass, although it might be homogeneous and of reasonably constant composition, was really suitable although something of that nature was desirable.

At the conclusion of his paper, Mr. Pedder showed several illustrations of his test-pieces with the aid of an epidiascope. He explained that the work was by no means conclusive and that surface tension of enamels merited further serious investigation. An acceptable abrasion test must be the evaluation of surface hardness and nothing else.

Discussion of this paper was related mainly to the details of the tests and such matters as whether or not the understructure of the enamel had been taken into consideration (affirmative reply); whether dry-process enamels had been tested (negative reply), and comparisons between the Taber Abrader and the Author's apparatus. On the latter point the Author said that when the majority of his tests were carried out, he had no Taber Abrader available for comparison. On the question of the effect of an enamel's bubble-structure, he thought that with a harder enamel which had more abrasive resistance generally it would be expected that the bubbles would be smaller.

Flame Spraying of Refractory Coatings

Mr. Manuel's paper on this subject dealt with the development of the process of flame-spraying the ceramics and Cermets as a result of the advent of the Metco Therm-Spray Process. After outlining the method of application and properties of such coatings, he listed a number of applications and results of field tests for alumina-base deposits as follow:—

(1) In the spray-coating of fan blades subject to abrasion, it was found in field tests that fine particles of abrasive had no effect on alumina coatings. Heavy abrasion, as by sandblasting, would break down the coating by impact, but the effect of fine abrasives was negligible. Alumina coatings sealed with a baked or catalyzed phenolic resin were relatively impermeable and would withstand a great deal of mechanical abuse.

(2) On some components, special corrosion problems could at times be solved by impregnating

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sprayed-alumina coatings with an appropriate sealer. The alumina provided physical-integrity and was completely inert to most chemicals. The sealer could be selected on the basis of resistance to the specific reagent involved, without the need of considering the physical properties of the sealer.

(3) On gauges, surface plates, instrument tables, etc., alumina coatings could be ground flat with diamond wheels, or even with silicon-carbide wheels, to produce a fairly smooth and very hard corrosion-resistant surface having a low friction coefficient. Impregnation with micro-crystalline wax or other sealants might be used here, where corrosive conditions were severe. Solid lubricants, such as molybdenum disulphide or graphite, were added to the impregnant for special bearing applications. Nearly all metals would run against such surfaces with very low friction and no tendency to gall.

(4) Special shapes in lapping plates, hones, grinding burrs, etc., could be made quickly and easily by applying sprayed alumina to the metal base. Old files, blasted and coated, made ideal "stones" for light stock removal such as was needed in making bearing fits.

(5) The use of sprayed-alumina coatings on special-purpose bearings, processing-rolls, filters, mixers or agitator parts, and a host of other possible applications could be expected to develop with time. Even though somewhat porous (6 to 10 per cent.), alumina coatings deposited in this way, had a compressive strength of about 90 tons per sq. in. Pores could be filled with an appropriate sealer with a lubricant, or left unfilled—as required.

(6) Both alumina and zirconia coatings were completely resistant to nearly all molten metals, although some of the common fluxes, for example, zinc-ammonium-chloride, would penetrate a coating and attack the base metal.

The discussion here concentrated chiefly on whether it was possible to spray enamels of the dry-process type effectively, but Mr. Manuel explained that although some firms had experimented with it, to get a completely non-porous coating, the material had to be sprayed while hot, when there was great difficulty in preventing the coating from shrinking and leaving the base metal. The experimental work had been slowed down because it was not possible to see any great advantages in the spraying method over ordinary enamelling practice, except for repairing defects. Replying to a question on undercoatings, Mr. Manuel explained that so far as preparation of components was concerned when spraying ceramics on to a grit-blasted base, reliance was made on the rough surface acting as a "key" for the deposit, an exception to this rule being when an undercoating such as nickel/chrome was used which had a higher bond-strength than sprayed ceramic. Molybdenum could also be used on cleaned steel to give a sprayed-metal key, but here its application was limited to comparatively low-temperature surfaces.

Technical Sessions IV and V

As mentioned in the conference proceedings survey*, technical sessions IV and V were held on the premises of the Ice Rink, Falkirk (so that members from local firms could attend). At the first of these sessions, a paper "Review of Zirconium Bath Enamels" was delivered by Mr. W. A. Ross (of Wengers, Limited). As preprints were available, Mr. Ross limited his introduction of the paper to its salient features. After first outlining the history of the development of zirconium enamels for baths, which began as far back as 1911, the Authors' review concerned those enamels which are opacified by zirconium compounds crystallizing out of the melt during firing. These he referred to as type II enamels—as described by King and Andrews, who did much of the development work on this type of enamel in the early 'forties. The theory of re-crystallization of such enamels, Mr. Ross described as being analogous with the crystallization of sugar from a hot-water solution on cooling.

The body of the paper was devoted to the study of the way in which zirconium-oxide could dissolve in a molten frit according to its temperature. Apparently, the subsequent capacity of the enamel depends on the formation of a number of insoluble crystalline deposits (formed on cooling), their size and refractory index. Interfering effects of alumina, zinc-oxide, barium-oxide or carbonate and fluorine were described at length and the paper continued by describing the manufacturing and composition of typical bath-enamels. Here, it was stated that the rotary frit melter gave excellent results with zirconium enamels due to the very rapid solution and the smaller surface area exposed, which conferred consistency on the product. Delegates were warned, however, against the danger of leaving a batch of materials containing hygroscopic constituents overnight in a damp atmosphere. Quenching and drying of these enamels were said to present no unusual difficulties, but running water was recommended for swilling. Batch or continuous mills could be used for grinding and there the process did not vary very much from that for antimony-opacified enamels.

Adoption in Practice

The final section of the paper discussed the *pros* and *cons* of the adoption of zirconium enamels for bath production, mention being made of the absence of toxic materials, such as were present in the old "leaded" enamels, the choice of complementary coefficients of thermal expansion, the ability of zirconium enamels to take fritted colours and, of course, their very high opacity (which helped to reduce the "dirt" problem). Amongst disadvantages mentioned was the difficulty in remelting waste enamel, the main drawback lying in the fact that fluorine lost during the re-melting process had to be compensated for. Another disadvantage was rather poor acid-resistance of these enamels, though this was countered to some extent by comparatively good alkali-resistance. Here, the Author had some remarks to make on the mechanism of acid and alkali attack. In conclusion, he mentioned the need

* See JOURNAL, July 24.

for much further research work, and said that soft zirconium dip-powders and semi-acid-resisting enamels seemed to be the extent of the range at the moment, though, in fact, this represented a great step forward.

At the discussion on this paper, Mr. J. Gray was in the chair and many of the comments were of a congratulatory nature, expressing appreciation of the Author's work and his exposition of the data. Further work was requested on alkali-resistance as compared with antimony-opacified material and on improving the re-crystallization of zirconium-base material. The Author said that the crystalline product was nearly always an oxide, and never found as a silicate. One speaker expressed surprise at the time lag there had been before developing zirconium enamels and mentioned that their acid-resistance could be made higher but in that case a lower alkali-resistance resulted, and in practice alkali-resistance was much more important for baths. Zirconium enamels have much better covering power than the antimony type and thus could be applied more thinly, he said; often, however, too great a thickness was applied because castings were rough. The Authors agreed with these remarks but thought heavy enamel application was not all due to casting roughness, but could be partly attributed to deficiencies in application technique. One of the foundrymen present, when asking about toxic effects and alkali-resistance, was informed that in making such enamels the fluorine mainly went up the furnace stack and only an insignificant amount was given off on quenching the frit; stack gases could be scrubbed to remove fluorine, but the process was expensive and there thus remained some hazard of "settlement" on nearby herbage and later, possible effects on cattle grazing on such herbage. Bath enamellers, the Author said, all seemed to have their own alkali-resistance tests, usually carried out at about 80 deg. C. by the effect of detergents, but he preferred to use 10 per cent. soda-ash solution for testing purposes and to measure the gloss loss against time; phosphates, he said, could also attack zirconium enamels. Continuing his comments in reply to questions, Mr. Ross said he didn't think buying back by frit manufacturers from enamellers of the zirconium enamel discard was yet practised, but there was nothing to stop maker and user re-melting this material in collaboration. Otherwise, zirconium enamel ought to be cheap; although the zinc-oxide used to replace the antimony in such formulations was in itself expensive, its price was coming down. The Clear Air Act might saddle zirconium-frit makers with the expense of scrubbing equipment, costing up to £10,000.

Steel-shot Applications

The final paper of the technical session, entitled "Developments in Steel Shot and its Applications to Vitreous Enamelling," was then given by Mr. D. W. S. Hurst (works manager of Bradleys (Darlaston), Limited) supported by Mr. J. Bradshaw, his co-author (whom he described as a "trouble-shooter"). (This paper had considerable interest to founders generally and is thus reviewed at some length in what follows.)

First, Mr. Hurst said the paper referred to the use of a blasting material which was definitely steel and not cast iron, and covered the development and use of this comparatively new material. Its composition he gave as approximately C, 1.14; Si, 0.72; S, 0.57; P, 0.06 and Mn, 1.28 per cent. The paper was divided into three sections: How the material was made; how it was used, and how it should be used. Given the trade names of Wheelabrator steel shot and Steeletts, the material was a product of the electric-arc melting furnace disintegrated in such a way as to form round shot, which was immediately quenched in cold water After recovery from water, it was dried and cleaned to remove slag and oxide and any malformed pieces. Then there was heat-treatment of the material in a rotary controlled-atmosphere furnace, itself followed by quenching and tempering (the final product having a hardness in the range of 420 to 480 VPN). This material then passed to the mechanical processing department for grading and packing; the Steeletts type being produced by crushing shot of suitable sizes in roll crushers and ball mills, while in the fully-hardened condition, *i.e.*, before subsequent tempering. The grading of these abrasives, the Author said, was a complete departure from that of chill-cast materials in that the newer types were graded to a published specification, showing grades and tolerances—the grade number expressed the actual size of the aperture of the retaining screen in inches (for example, shot form S.550 and grit form G.55 were both retained on a screen having an aperture of 0.55 in.).

Use in Existing Plant

It was stressed that abrasive material of the quality described could not be used with success in standard shotblasting plants until proper precautions had been taken to adapt the process and plant for the new material. Mr. Bradshaw then explained the part of the paper elaborating these requirements. For example, with the belt-type Wheelabrator plant, he said, initial trouble with the new abrasive had been the distortion of thin-section castings and other items being processed. The new abrasive gave a heavier blast-stream from the impeller because steel was a denser abrasive, it had a greater impact and velocity, and approximately 25 per cent. more abrasive was thrown by the same impeller running at the same speed. One remedy for this trouble was to speed-up the rate of travel of the belt and thus increase the throughput of the machine, but the real solution lay in the redesigning of the plant to "angle" the discharge from the impeller. Following this idea, a new multi-table plant had been developed incorporating four 4-ft. dia. tables, arranged under angled impeller-wheels and this was proving very satisfactory in preparing components for vitreous enamelling.

A further necessity was increased maintenance precautions to cope with the effect of ricochet of the abrasive on to the walls of the shotblasting

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cabinet, and here, special wear-resisting inserts were recommended, as rubber curtains had proved unserviceable. Worktables and belts of rubber were also described as unpractical. For lining cabinets and the like, it was recommended that hard-metal tiles be fitted to roof and sides. In using the abrasive —which was quite expensive—it was important to avoid casual loss of the material, for instance, by carrying it away lodged inside castings. Similarly, in the plant itself, it was necessary to ensure good separation of the abrasive from tramp iron, dust, etc., and usually the makers could be called upon to adjust the separator of the shotblast plant to suit the new abrasive. The control-cage of the impeller-wheel feed needed adjustment for using steel shot, to give a proper impingement pattern on the components being treated. As round shot flowed quicker and left the blades at a higher velocity, the Authors said, the latter tended to wear more evenly and quite good "life" was obtained for these components, and the same remark applied to "cages" also. Another precaution was to make sure that the "shot dish" of the plant did not build up with abrasive.

Mr. Bradshaw, at this point in the proceedings, showed a comparative table of twelve-months' operating costs for shotblast plant using, first, chilled iron and then, steel abrasives. It portrayed a cost reduction when using the new material of from £1 14s. to 15s. per ton of castings cleaned, the cost including materials, spares and maintenance. As for the correlation between the cleaning and the enamelling processes, he said that the new material seemed somewhat to favour preparations for enamel. However, this type of surface preparation was not so good for matt-groundcoat application, where mechanical adhesion was a necessary complement. The steel abrasive had rather a peening action and could not always be relied upon to remove heavily-burned-on sand from castings, the same comment also applying to very rusty castings and the use of abrasives in stripping for re-enamelling, success at which was a function of abrasive impact. (Concluding the brief review of their paper, the Authors invited queries from members and readers by post, as it was obvious only limited time was available for discussion.)

Discussion

Asked whether the new abrasive was suitable for cleaning baths and about the possibility of breakage of castings, Mr. Hurst replied that not much success had yet attended treatment of bath castings, possibly because the requirements of dry-process enamelling were different from those of the wet-process. Breakage, he said, was often caused by too-violent impingement of the abrasive resulting from unsuitable plant design. Here, another speaker said he had used Steeletts on bath cleaning and found they broke up, the steel shot produced warpage of some castings and "feather edges" on castings could be damaged. In reply, the Authors stressed that it was important to assess each abrasive-cleaning requirement on its merits, for practical experience was the only true criterion —so long as it was borne in mind that standard plant did need modification to use the new abrasive.

(Here, the chairman had to close the meeting owing to lack of time for further discussion and thus brought to an end the technical proceedings of the conference.)

Platt/Stone Merger

Documents in connection with the proposed merger of Platt Bros. & Company (Holdings), Limited, and J. Stone & Company (Holdings), Limited, have now been despatched to shareholders. The boards of both companies and Philip Hill, Higginson & Company consider the terms fair and reasonable to all parties. It is intended to retain the identities of the respective groups under their existing managements, but to change the name of Platts to Stone-Platt Industries, Limited.

It is expected that profits for 1958 will justify the payment of a 15 per cent. dividend on the ordinary capital of Platts as increased as a result of the merger. On the basis of the audited consolidated profit and loss accounts of each company for 1957, combined profits, after all expenses other than debenture interest and taxation, would have been £3,413,155. If profits of this amount are earned in 1958, there would remain about £1,250,000 available for payment of a dividend and for retention in the business.

The market value at the present time of the combined quoted investments held by the new group would exceed £2,000,000 which, if the amalgamation takes place, should provide resources adequate for foreseeable expansion, it is stated.

A. KERSHAW & SONS, LIMITED—Sir Cullum Welch has been appointed a director and elected chairman. He succeeds Comdr. W. B. Pirie, who resigned from the board owing to ill-health.

Shipbuilding Orders Cancelled

Four ships have been cancelled, and a fifth indefinitely postponed, reports Mr. E. P. Brown, chairman of the Caledon Shipbuilding & Engineering Company, Limited, this being the company's first real experience of the effects of the current shipping recession. With the substantial volume of work on hand, however, little despondency is felt for the present year's trading prospects, and a satisfactory outcome is anticipated.

As for the future, orders will certainly become farther between, and competition, particularly from the ultra-modern West German and Japanese yards, will intensify.

The group's own modernization scheme is now completed, accounting in large part for the £454,082 expended during the last three years, and during the year to March 31 two cargo liners were completed, another vessel almost completed, and rapid advancement made with other work on the stocks. Net profit was £123,909 (£91,187) and the dividend stood once again at 8 per cent.

AFTER SOME MONTHS of short time, full-time working has been resumed in all departments of the Park Foundry, Belper, near Derby. A contract for railway castings had been secured from Nigeria, also the firm have a number of new projects on hand, which will keep the works on full time.

News in Brief

TUBE INVESTMENTS, LIMITED, The Adelphi, London, W.C.2, have issued a directory of their various companies. As there are over 50 listed, such a publication is extremely useful.

J. T. PRICE & COMPANY, LIMITED, brass and aluminium founders, of Newcastle, Staffs, report that their telephone numbers and telegraphic address has been changed to Newcastle, Staffs., 52311 (3 lines).

ON AUGUST 11, Kelvin & Hughes (Industrial), Limited, are moving their administrative offices from 2, Caxton Street, Westminster, London, S.W.1, to their new building at: Empire Way, Wembley, Middlesex. (Telephone: WEMBley 8888).

NATIONAL INDUSTRIAL SAFETY WEEK is to be held throughout the country from September 29 to October 4. Stress is being placed on the incidence of accidents through falls and "Humpty Bumpty" has been created to epitomize the main theme of the campaign "Extra Care Stops Falls."

THOMAS FLETCHER & COMPANY, LIMITED, civil engineering contractors of Mansfield and London, have received an order from the Eastern Region of British Railways to construct a new railway, five miles long, from Bevercotes Colliery (Notts) to the Eastern Region line at Boughton near Ollerton.

THE Incorporated Plant Engineers in announcing a change of address mention that the institution's head office closes at Solihull on the afternoon of July 31 and reopens on the morning of August 6 at 2, Grosvenor Gardens, London, S.W.1, 'phone: SLOANE 0469, 'grams: Planteng Sowest, London.

"RENISHAW IRON WORKS," a painting by Mrs. Druie Bowett, which has been on view at the Royal Scottish Academy, has been bought by the Duke of Edinburgh. It is one of a number of industrial paintings the artist completed in 1956, and was included in an exhibition on industrial Britain in London in 1957.

THE 1957 ANNUAL REPORTS of the Natural Rubber Development Board and Rubber Technical Developments, Limited, both with head offices at Market Buildings, Mark Lane, London, E.C.3, record interesting developments in the fields of road making, engineering, railways, furniture and building construction.

THE BOARD OF TRADE ANNOUNCE certain changes in export licensing which came into force on July 28. Owing to the easier supply position licences are no longer required for the export of ingots, billets, blooms and other semi-manufactures of carbon steel or of certain nickel-bearing steels of non-strategic types.

IN FURTHERANCE of the "Use-more-peat" plan of the Irish Peat Board, Hammond Lane Foundry, Dublin, are producing for sale to the general public, a new space-heating stove which burns peat. After filling the hopper and setting the automatic-speed feed, a controlled-heat fire is available for seven to 10 hours and all particles of the peat are utilized

WILLIAM MCGEOCH & COMPANY, LIMITED, Birmingham brassfounders, held its first long-service awards presentation ceremony on July 18. Hitherto the company has made recognition of long service on the retirement of an employee. At the recent ceremony, 26 employees received awards and amongst them was Mr. W. P. McGeoch, managing director since 1948. The senior recipient was Mr. E. A. Savory, a departmental manager who joined the firm in 1901.

TO CELEBRATE the silver jubilee of the firm's operations in Bedford, Britannia Iron & Steel Works, Limited, malleable ironfounders and tube fittings manufacturers, opened their works in Kempston road, Bedford, to the general public for the first time on July 19. The company took over in 1933, the premises of James & Frederick Howard, Limited, agricultural implement manufacturers, and are associated with George Fischer, Limited, Schaffhausen, Switzerland.

CONVERSATIONS to make clear the various aspects of the collaboration envisaged between the United Kingdom and Euratom in the field of the peaceful use of nuclear energy, begun in London on June 18 and 19, were continued on July 14 and 15, in Brussels, by a British delegation composed of Mr. Pierson, secretary of the Atomic Energy Authority, and Mr. Vallat, Mr. Thompson and Mr. Cape, and representatives of the Euratom Commission. The two delegations will resume their work in London towards the middle of September.

WILSONS & MATHIESONS, LIMITED, Leeds, are flying gas cookers from Manchester to Dublin by Aer Lingus freighter aircraft to ensure deliveries to customers in Eire within 24 hours of an order being received. The company has decided to make it a regular delivery service. A cost analysis revealed that when savings in time, packing materials, damage in transit, insurance, Customs clearance and delivery to stockists were taken into account, the cost was less than by the previous land and sea routes.

THE FIRST EXPORT SALES CONFERENCE of the Arcon Group of manufacturers of prefabricated buildings, held in London this month, was attended by seven of the overseas staff representatives. The programme, lasting two weeks, included visits to the design departments of the Group's consulting architects, to the prototype site at Southall and to United Kingdom sites at which Arcon industrial buildings are being erected. Progress reports from the representatives were given, and discussions held with directors and executives of Taylor Woodrow (Building Exports), Limited, the marketing member of the Arcon Group.

MORTIMER ENGINEERING COMPANY and Stanhope Machine Tools, Limited, announce that an agreement has been reached between them whereby as from August 1 the two companies will be co-operating in the sale and servicing of the ranges of machine-tools and machine-shop equipment for which the two companies hold representations throughout the United Kingdom. Both companies will continue to operate separately, but the pooling of many of their present facilities is envisaged. On July 28 Stanhope Machine Tools opened new offices and showrooms at 202, Acton Lane, Harlesden, London, N.W.10, *i.e.*, adjacent to the premises of the Mortimer Engineering Company at 204-206, Acton Lane, Harlesden.

IN AN ADDRESS given at the annual conference of the British Medical Association, in Birmingham, Prof. G. P. Crowden dealt with the requirements of the "human machine" in industry. He urged the need for the understanding of such requirements and stressed the desirability of including instruction on the subject at engineering colleges to ensure greater industrial efficiency from workers. The problem of posture in industry was one of many factors which affected the overall day-to-day working capacity, comfort and health of men and women operating machines, he said, and gave examples where minor alterations to machines had obviated such problems as absenteeism because of the tiring of muscles. He also stressed the value of changes of posture during work and of varying the task performed.

A CEREMONY WAS HELD on July 18 to commemorate the one hundredth anniversary of the first mass-pro-

News in Brief

duction of ingot steel in the world, on the original site of the old blast furnace at Edsken in Sweden. As reported in this JOURNAL, July 3 issue, p. 14, the furnace was erected by G. F. Göransson in 1857 to experiment with the production of steel according to the Henry Bessemer process. From these early experiments has come one of the most famous names in steel manufacture in the world—Sandviken. At a banquet in the evening, a gold medal was presented to the company by the Swedish Iron Masters Association. The Association is one of the oldest in the world, and its history goes back more than 200 years. This is the first time that the Association has presented a medal to an industrial organization.

NOTICE OF FORTHCOMING CLOSURE has been given to employees at the Blackness Engineering Works of Urquhart Lindsay & Robertson Orchar Limited. About 500 men will be affected by the closing of the works, which is expected to become effective at the end of August or early September. In March last, the firm announced the closing of Bellfield and Townshend Works and Wallace Foundry, as there was very little work left for these establishments. The firm is a subsidiary of Fairbairn, Lawson, Combe Barbour Limited, Leeds. Blackness Foundry, as the works was known until recently, dates from 1865 and its textile machinery products for the jute industry have gone all over the world. In an attempt to avert the closure, Dundee's Lord Provost, William Hughes, and the city's two M.P.s are visiting London to press the Ministers to intervene.

THE NEW BATH PLANT of Bilston Foundries, Limited, at Batmans Hill (a full account of which was published in the JOURNAL, May 1 issue), is reported by the chairman, Mr. T. I. Hobart, to be "fulfilling its promise in every way," and given normal trading conditions the group should be able to look forward to a period of steady progress. Discussing turnover for the current year to date in his annual report, Mr. Hobart said that this compares favourably with that of the corresponding period of last year. The outlook, in view of the new production capacity, would seem to be highly encouraging. Bilston Foundries' net profit for the year to March 31 last was £129,421 compared with £101,996 previously and dividend is maintained at 15 per cent. Fixed assets are £834,193 against £527,742 and current assets £432,045 against £603,423. Liabilities are £279,863 against £262,486, and future tax £55,000 against £80,500. Reserves are £316,378 against £223,182, and commitments £45,000 against £325,000. The annual meeting will be held at Bilston on August 7.

THE MOTOR INDUSTRY is the most important factor in the maintenance of employment in the Midlands, Major C. R. Dibben, chairman of the Midland Regional Board for Industry, said on July 15 after a meeting of the Board in Birmingham. He commented on the downward trend of industrial activity in the region outside the car industry, and said the signs were (1) less overtime was being worked, (2) conditions were more competitive, (3) prices were keener, (4) profit margins were narrower, and (5) public spending had fallen. Industry, however, was still well placed in the Midlands compared with some other parts of the country, he said. Last month, unemployment in the Midland region rose by nearly 1,456 while nationally there was a fall. The Midland percentage is now 1.5 compared with the national average of 2 per cent. The Board of Trade reported that during the first half of this year, 171 schemes for new factory building in the region were approved involving 3,100,000 sq. ft. of factory space, compared with 206 schemes for 5,600,000 sq. ft. in the first half of 1957.

British and World Shipbuilding

Lloyd's Register Returns for June Quarter

Steamships and motorships under construction in Great Britain and Northern Ireland at the end of June totalled 336 ships of 2,295,371 tons gross, an increase of 31,517 tons compared with the previous quarter, states Lloyd's Register of shipbuilding returns relating to merchant ships of 100 tons gross and upwards. The vessels included 70 steamships of 1,102,860 tons and 266 motorships of 1,192,511 tons. In other British Commonwealth countries there were under construction 12 steamships of 98,371 tons and 58 motorships of 143,883 tons. Oil tankers building in Great Britain and Northern Ireland totalled 74 ships of 1,109,990 tons, an increase of 40,752 tons compared with the previous quarter, and representing 48.4 per cent. of the total tonnage under construction in this country.

Vessels building in the world numbered 1,651 of 10,133,497 tons compared with 1,732 of 10,065,459 tons in the previous quarter. The total included 311 steamers of 4,648,954 tons and 1,340 motorships of 5,484,543 tons. Construction in hand in the principal districts of Great Britain and Northern Ireland is indicated in Table 1.

TABLE 1.—*Shipbuilding Construction in Hand in Principal Districts of Great Britain and Northern Ireland.*

District.	June 30, 1958.		March 31, 1958.		June 30, 1957.	
	No.	Gross tonnage.	No.	Gross tonnage.	No.	Gross tonnage.
Aberdeen ..	17	25,761	16	18,882	18	26,584
Barrow ..	3	94,000	2	67,000	3	68,770
Belfast ..	19	337,800	17	298,490	19	248,973
Bristol ..	3	6,200	4	6,430	4	1,845
Clyde—						
Glasgow ..	70	518,302	69	455,263	69	437,459
Greenock ..	29	158,810	31	178,110	27	177,420
Dundee ..	5	35,095	7	48,550	6	38,700
Hartlepool ..	7	53,640	9	71,080	7	56,900
Hull	36	17,267	33	17,153	33	17,017
Leith	11	61,657	13	69,590	11	54,400
Liverpool ..	12	106,202	15	145,487	15	128,623
Middlesbrough	16	201,141	16	206,843	14	163,918
Newcastle-on-Tyne ..	38	382,352	41	421,700	39	409,590
Southampton	9	3,669	10	6,921	5	3,800
Sunderland ..	31	268,380	26	217,862	28	207,197

The sizes of steamships and motorships (in parentheses) under construction in Great Britain and Northern Ireland included the following:—100 to 500 tons, 6 steam (78 motor); 500 to 1,000 tons, 6 steam (28); 1,000 to 2,000 tons, steam, nil (24); 2,000 to 4,000 tons, 1 steam (14); 4,000 to 6,000 tons, 1 steam (24); 6,000 to 8,000 tons, 2 steam (19); 8,000 to 10,000 tons, 5 steam (42); 10,000 to 15,000 tons, 17 steam (33); 15,000 to 20,000 tons, 4 steam (1); 20,000 to 25,000 tons, 13 steam (3); 25,000 to 30,000 tons, 8 steam (nil); 30,000 to 40,000 tons, 5 steam (nil); 40,000 tons and above, 2 steam (nil).

Of the steam and motor merchant ships under construction throughout the world at the end of June, 5,598,600 tons (55.2 per cent.) are under the inspection of Lloyd's Register.

AT THE LAUNCHING of the ore-carrier, Silvercrag (15,460 tons) from the yard of Sir James Laing & Sons, Limited, Sunderland, Mr. A. J. Marr, managing director, commented that steel supplies were now adequate, but ship orders were not being received. He hoped that the time would not come again when shipbuilders went after orders which never materialized.

Personal

Sir LESLIE ROWAN is to be appointed a director of Vickers, Limited, when he retires from his present position as second secretary of the Treasury towards the end of the year.

Mr. GEORGE WEST has been appointed export manager of the chemicals division of Newton Chambers and Company, Limited, in place of the late Mr. C. R. LUND

Mr. W. H. CHRISTIE, who for some years has been in charge of Radiation, Limited's production centre at Leeds, has been appointed general manager of the Group's Grappenhall and Palatine Works at Warrington.

Mr. LEONARD ROYLE has been appointed a director of J. Samuel White & Company, Limited, in addition to his present appointment as manager of the aircraft and refrigeration division. He joined the company in 1936.

Mr. P. S. BEALE, formerly chief cashier at the Bank of England, and recently general manager of the Industrial Credit & Investment Corporation of India, has been appointed a director of the British Oxygen Company, Limited.

Mr. A. D. KERR, M.B.E., chief draughtsman with Drysdale & Company, Limited, pump manufacturers, Glasgow, has retired after 48 years' service with the company. He was appointed chief draughtsman in 1927, having joined the firm in 1909.

Mr. D. H. WALLACE, of Douglas Fraser & Sons, Limited, engineers, Arbroath, has retired as works manager after holding the position for 22 years. The employees presented him with an electric fire. He is continuing with the firm as a director.

Mr. S. L. HOLLIS has been appointed a director of Guy Motors, Limited, Wolverhampton. Mr. Hollis who was formerly a "local director" will continue to hold the office of company secretary. He has also been appointed a director of Guy Motors Africa (Pty.), Limited.

Siemens Edison Swan, Limited, announce further appointments in their cable divisions: Mr. R. G. HOLLAND has been appointed assistant cable sales manager, special contracts, and Mr. R. B. TUCKER, has been appointed assistant sales manager, rubber and plastic cable division.

RECENTLY appointed by the British Productivity Council as a director of the National Industrial Fuel Efficiency Service, Dr. W. ANGUS MACFARLANE has now been appointed managing director. The appointment was made at a meeting of the board of NIFES on July 14.

Mr. P. W. FAULKNER, general manager of the chemical and metallurgical division of the Plessey Company, Limited, since 1953, has been appointed a director and general manager of Plessey International, Limited. He remains an executive director of the Plessey company and a director of Technical Ceramics.

VISCOUNT DE L'ISLE, V.C., has been elected president of the Office Management Association for 1958-1959. He succeeds LORD LYLE OF WESTBOURNE, who has ben president since 1955. Mr. GEOFFREY J. MILLS, deputy chief comptroller of J. Lyons & Company, Limited, has been elected chairman of the Council.

Mr. R. T. HAYES has been appointed a director of United Coke and Chemicals Company, Limited, a subsidiary of the United Steel Companies, Limited. Mr. Hayes, who joined the United Steel group in 1946, is commercial manager of United Coke and Chemicals, and of United Steel's ore-mining branch and the Santon Mining Company, Limited.

Two West Bromwich brothers, Mr. FRANK and Mr. FRED COOPER, have between them completed 119 years in the service of one company—Geo. Salter & Company, Limited, spring and spring balance makers. At the age of 71, Fred Cooper has now retired after 59 years' continuous service—but at 73, brother Frank is still at work with the company he joined 60 years ago.

Mr. G. W. GIBSON, managing director of Fry's Metal Foundries, Limited, Merton Abbey, London, has retired after 44 years' association with the company. He joined the firm in 1914 and in 1916 was appointed manager of the newly opened Manchester foundry. Four years later he became manager of the printing metal department in London and was appointed managing director in 1947.

Mr. L. A. DAY, an apprentice patternmaker, at Rolls-Royce, Limited, has been selected to represent this country in the A category (born in 1937, 1938 and 1939) at the International Apprentices Competition to be held in Brussels between August 2 and August 16. With him will be Mr. J. E. Trott an apprentice at Skefko Ball Bearing Company, Limited, who is in category B (boys born between 1940 to 1942).

The organization of the Indian Steelworks Construction Company, Limited, being fully established, Mr. R. J. BARRITT is resigning as managing director as from September 1, in order to return to company work. He will, however, be available to the board of ISCON for consultation. Mr. W. S. HINDSON, at present chief engineer of the Indian Steelworks Construction Company, Limited, has been appointed as managing director in his place.

FORTY YEARS SERVICE with the Anderston Foundry Company, Limited's, Port Clarence, Co. Durham, foundry was marked at a ceremony recently when Mr. James Welsh, a machine moulder, was guest of honour. Presenting a gold watch to him on behalf of the board of directors, Mr. G. D. Cunningham, chairman and managing director, said it was a unique and historic occasion. He pointed out that Mr. Welsh had been a shop steward for no fewer than 23 years and commented: "If there are other shop stewards with more than 23 years in such a post I would be very surprised."

The decision of the Council to create the office of vice-chairman and to elect Dr. R. HUNTER (Clyde Alloy Steel Company, Limited) to this position was announced by the chairman, Mr. C. H. Kain (Lake & Elliot, Limited) at the recent annual general meeting in London of the British Steel Castings Research Association. Mr. Kain also announced the recent retirement of Mr. FRANK ROWE (K. & L. Steelfounders & Engineers, Limited) from the chairmanship of the Finance Committee and the election of Sir WILLIAM SCOTT (Jarrow Metal Industries, Limited) as his successor. Mr. A. H. CATTON (Catton & Company, Limited), Dr. C. J. DADSWELL (English Steel Castings Corporation, Limited), Mr. A. B. LLOYD (F. H Lloyd & Company, Limited), and Sir WILLIAM SCOTT, the members of the Council retiring by rotation, were re-elected for a five-year term.

Obituary

Mr. CHARLES B. ARNOLD, works manager of the Consolidated Pneumatic Tool Company, Limited, Tullos, Aberdeen, died on July 16. He was 56 and had been at the factory since 1953. A London man, he spent all his working life with the company, joining the London office at the age of 19.

Publications Received

La Pièce de Fonderie (Castings). Issued by Comite Europèen des Associations des Fonderies, 2, Rue de Bassano, Paris.

This book is addressed to the user of any type of castings. It enters into the category of a prestige publication, being alike magnificently printed and illustrated. After a foreword, in which a historical survey is included, the main techniques used in the foundry industry are summarized. Then each foundry metal is dealt with separately, starting with the irons, and the extensive list of sub-divisions printed would surprise even the most knowledgeable of foundrymen. The steel, copper, copper-base, zinc, and light alloys are similarly treated in that order.

Notes are included to help the designer better to understand cast metals and to use this information to produce blueprints of castings conforming to the rules of good foundry practice.

The third section is addressed to the purchasing agent. It tells him that the founder cannot give him a proper price for castings merely when he states "a pattern to be provided by us." He should, of course, define exactly just what this means. Rightly, this important factor is entered into in detail. Finally, the reviewer emphasizes the excellence of the illustrations in this noteworthy brochure.

Servicing the World. Issued by the British Electrical and Allied Manufacturers' Association, 36, Kingsway, London, W.C.2, in association with allied bodies.

This 48-page well-printed and splendidly-illustrated brochure has been produced for distribution to important visitors to the British electrical industries stand at the Brussels Exhibition. From a map on the inside back cover, it is shown that Europe is the leading customer for British electrical machinery, having purchased equipment to the value of £250,000,000 during the last four years out of a grand total for the period of £1,000,000,000. The brochure carries, after a historial introduction, four articles covering "Energy in Harness," which includes sub-sections on water power and nuclear power; "Links of Power and Servicing Mankind," with again sub-divisions covering telecommunications, electronics, industry, radio and television, and lighting and domestic. Finally, there is a chapter on "Looking Ahead." These are well written; they are illustrated by views of plants supplied overseas and devoid of too much technical jargon. The only part of the publication which does not please the reviewer is the inside front cover which is a composite picture where one illustration invariably detracts from the others, resulting in mental confusion.

Electrical Accidents and their Causes, 1956. Published for the Ministry of Labour and National Service by Her Majesty's Stationery Office, York House, Kingsway, London, W.C.2; price 4s. 6d. net.

Of major importance in this report is the warning given as to the potential danger to be associated with the use of portable tools and plant, and a table shows two accidents occurred in the foundry from the use of "sand riddles and royers." The writer assumes that this implies plant of the "Royer" make, but this is not necessarily so. The consumption of electricity has greatly increased recently, yet the number of electrical accidents—in the region of 775 per year—remains stationary. The report indicates that risk of fire outbreak increases with age of equipment. Whilst no definite figure is available as to the total of fatal electrical accidents in homes, those coming to the notice of the Factory Inspectorate numbered 55, the highest to be recorded since 1942. The "do-it-yourself" craze is probably responsible for an equivalent increase in home accidents. It should be remembered that the same factor operates in works, and the maintenance of electrical machinery should be confined to skilled men.

Annual Report, 1957. Published by the British Iron and Steel Research Association, 11, Park Lane, London, W.1.

This is the largest of the metallurgical research associations and last year its income was £671,378. It is decentralized in its activities and has laboratories in London, Sheffield, South Wales, and Middlesbrough. Though it has nine or 10 divisions and departments, it avoids overlapping and duplication of effort by co-operating with other research organizations. For instance, the question of ingot-mould life and behaviour is shared with the British Cast Iron Research Association. Here there is a recommendation that the bituminous paint used as a mould dressing should, for the reason of uniformity, be sprayed on the surface and not hand coated by brush. Sulphur pick-up from the cores during the making of ingot moulds, even when deliberately increased, was shown to have no adverse effect on mould life.

Welding of Steel Castings in the Light of Modern Practice. Published as Bulletin No. 8, Vol. 2, by the British Steel Founders' Association, Broomgrove Lodge, 13, Broomgrove Road, Sheffield, 10.

That: "welding is now recognized as a legitimate process in the production of sound steel castings" is stated in this *Bulletin*. It was not always so and the recognition of this to-day has now been brought about by the parallel improvements, both in the art of welding and steel-castings production. This is all to the good and the seal is set on the operation by the fact that composite structures, involving both steel castings and weldings, are to-day articles of commerce. The booklet, which runs to 14 pages, is well illustrated and enters very thoroughly into the practical methods through which a really good job of welding can be guaranteed. British Standard 3100: 1957 now carries a clause governing the repair of castings by welding.

Prospectus. Issued by the Poplar Technical College, Poplar High Street, London, E.4.

This is one of the few technical colleges in the London area providing courses covering the requirements of the City and Guilds of London examinations in both patternmaking and foundry practice. Moreover, it is interesting to note that a post-City and Guilds class is available to patternmakers who hold the final certificate or who have been journeymen patternmakers for not less than 10 years. The instruction, of an advanced standard, includes gearing and propeller work, and the work is supplemented by practical moulding. Students who have not the City and Guilds qualifications will have to take ancillary subjects in calculations and geometry to enable them properly to appreciate the instruction given.

Annuaire, 1958 (Yearbook) of the *Association Technique de Fonderie*, 2 Rue de Bassano, Paris.

This yearbook contains a list of members of the Association, both alphabetically and geographically. The latter is useful for business men travelling in France as the list is a mixture of firms and individuals. The bye-laws of the *Association* are included.

Company News

CHAS. CARR, LIMITED, makers of non-ferrous castings crucible furnaces, etc., of Smethwick (Staffs)—Net profit for the year to June 30, 1958, is £7,322 (£13,626) after tax of £10,015 (£19,049). A final dividend of 5 (10) per cent. makes 12½ (25) per cent.

WEILMAN SMITH OWEN ENGINEERING CORPORATION, LIMITED—A final dividend of 15 (12½) per cent. is recommended, making 25 (22½) per cent. Group net manufacturing and trading profits advanced from £285.173 to £396.395 in the year ended March 31, 1958. Profits attributable to the holding company totalled £396,314, compared with £284,785 previously.

WILMER LEA FOUNDRIES, LIMITED—The company is not paying a dividend on the £150,000 one-class capital for the year to March 31, 1958, against 4 per cent. Consolidated profit after all charges is £862 (£19.688). After deducting a provision for obsolescent plant and machinery and for the exceptional depreciation of £8,605 (£3.000) and taxation nil (£11,084), there is a loss of £7,743 (profit of £5,634).

DAVY & UNITED ENGINEERING COMPANY, LIMITED—The company is increasing the dividend on its £1,132,146 one-class capital by 5 per cent. to 20 per cent. for the year ended March 31, 1958. The distribution takes £130.197, against £97,648. Group trading profits, etc., advanced from £641,642 to £1,310,422. After higher charges for depreciation and tax, the net balance is up from £240,992 to £532,265.

UNITED GAS INDUSTRIES, LIMITED—The company is cutting its final ordinary dividend from 10½ per cent. to 8½ per cent., making 12½ per cent. for the year to March 31, 1958, against 14 per cent. The deferred dividend is lowered from 112½ per cent. to 70⅝ per cent. Group net profits of £109.241 compared with £127,516, and there is an additional debit tax adjustment for earlier years of £5,579, against a credit of £51,018 for 1956-57.

NEWMAN, HENDER & COMPANY, LIMITED, iron and non-ferrous founders, etc., of Stroud (Glos)—The company is paying a final dividend of 10 per cent., making 12½ per cent., as forecast, on the £1.067.359 ordinary for the year to March 29, 1958. A total of 25 per cent. for 1956-57 was paid on the £444,733 capital prior to a one-for-one free scrip issue and a two-for-five rights issue. Group net profit rose from £418,163 to £478,516, and the net profit is up from £180,384 to £191,016.

BRITISH OXYGEN COMPANY, LIMITED—The directors state that although the results for the first year are satisfactory and encouraging, in view of all the circumstances, national and international, they feel it prudent to reserve for further consideration the question of an increase in dividend until the end of the year. Interim dividend in respect of the year to September 30, 1958, is unchanged at 4 per cent. A final of 6 per cent. made a total of 10 per cent. on the £17,047,166 ordinary for 1956-57.

WILLIAM JACKS & COMPANY, LIMITED, metal merchants, etc., of London, E.C.4—The company is paying a final dividend of 10 per cent., making 15 per cent. for 1957 on the £614,925 ordinary as increased by a one-for-two scrip issue. For 1956 a total of 20 per cent., less tax, and a 2½ per cent. capital profits distribution were paid on the former capital. The directors consider making an interim distribution of 2½ per cent. (not taxable) next January from capital profits.

New Patents

(Copies of complete specifications are obtainable from the Patent Office, Sales Branch, 25, Southampton Buildings, Chancery Lane, London, W.C.2, price 3s. 6d.)

795,205. Revo Electric Company, Limited, Tividale, Tipton, Staffs.

A method of forming a composite metal article, such as a heat-exchanger, where a number of stainless-steel tubes, for example, require to be embedded within, and alloyed to, an aluminium basin in the form of a block.

The body or bodies whilst supported within a mould are heated to between 700 deg. C. and 1,110 deg. C. by passing through them an electric current. Molten aluminium is then introduced into the mould in the presence of a de-oxidizing atmosphere, the electric current being maintained (after the mould has been filled) for sufficient time to permit the outer surfaces of the body or bodies to alloy with the immediately surrounding aluminium.

795,224. General Motors Corporation, Grand Boulevard, Detroit, Michigan, USA.

A method of making an internal-combustion-engine cylinder-block, whereby the cylinder bore of the engine can be increased without increasing the length of the cylinder-block.

The invention makes use of cylinder cores having flattened surfaces which are diametrically opposed and extend in a direction normal to a plane joining or practically joining the axes of the cylinders. It also employs water-jacket cores having openings with similar and co-operating surfaces.

Contracts Open

The dates given are the latest on which tenders will be accepted. The addresses are those from which forms of tender may be obtained. Details of tenders with the reference ESB can be obtained from the Board of Trade Export Services Branch, Lacon House, Theobalds Road, London, W.C.1 (telephone : CHAncery 4411, ext. 738 or 771), unless otherwise stated.

BUILTH, August 29—Construction of about 18,300 lin. yd. of spun-iron water mains, 3-in., 6-in., 7-in., and 8-in. dia. Documents from A. H. S. Waters and Partners, 25, Temple Row, Birmingham, 2. Deposit £5 5s. 0d.

BRIDGNORTH, August 29—Construction of about 11,350 lin. yd. spun-iron and asbestos cement water mains, 3 and 4-in. dia. Documents from A. H. S. Waters and Partners, 25, Temple Row, Birmingham, 2. Deposit £5 5s. 0d.

BURMA, August 8—Cast-iron surface plates. (ESB/18552/58.)

BURMA, September 3—Requirements include cast-iron fittings, valves, and pumps and pumping sets, for village water supply and sanitation project. (ESB/14029/58/ICA.)

FARNHAM, SURREY, August 25—In connection with town drainage scheme for UDC requirements include approximately 1,250 lin. yd. of 18-in. dia. spun-iron pumping main. Documents from Geoffrey Poole, engineer and surveyor, Council Offices, South Street, Farnham. Deposit £5 5s. 0d.

FORMOSA, August 11—Submersible pumps. (ESB/18577/58.)

ITALY—Ing. Ernesto Kirchner & Company, S.p.A., of Via Varanini 6, Milan, have informed the British Consulate-General at Milan that they are desirous of securing the representation for Italy of United Kingdom manufacturers of woodworking machinery. (ESB/18194/58.)

INDIA, August 11—Earth-moving and coal-mining machinery. (ESB/17116/58.)

INDIA, August 8—Air compressors. (ESB/18184/58.)

SOUTH AFRICA, August 14—Heavy-duty double-ended pedestal grinder. (ESB/18429/58.)

UNION OF SOUTH AFRICA, August 7—Requirements include a continuous weigher. (ESB/18358/58.)

USA—Lempco International Inc., P.O. Box 131, Dunham Road, Bedford, Ohio, have advised the British Consulate-General at Cleveland that they would like to get into touch with United Kingdom suppliers of replacement parts for British, Continental and US motor cars. (ESB/18148/58.)

Raw Material Markets

Iron and Steel

Although production of pig-iron continues to decline at the smaller number of furnaces now in blast, output still exceeds demand and there is no pressure for supplies of any grade of iron. The furnaces are well provided with raw materials, and, with the deliveries of iron ore from overseas coupled with the supplies from home sources, consumption and stock requirements are fully met. Blast-furnace coke supplies are also adequate, and sufficient tonnages of raw materials are on hand to provide for increased outputs when the need arises.

The foundries are carrying only a small working stock, with no apparent intention to book far ahead in view of the present uncertainties of trade, and also of prices which it is felt may be reduced on account of the large stocks held by producers. These stocks continue to grow as daily outputs exceed despatches. Appreciable tonnages of pig-iron are held at the furnaces and are likely to be still further increased by holidays.

In the Birmingham and Staffordshire areas most of the foundries are closed until August 11 and only repair staffs are at work. Consumers should not be adversely affected by suspension in deliveries of castings as schedules are mainly up to date.

The engineering and speciality foundries have fairly good order-books, although these are not so heavy as they were and there is not the same pressure for castings. The motor-vehicle trade continues to use large tonnages of castings, and from machine-tool makers, heavy engineering, power and electrical plant manufacturers, agricultural implement makers, steelworks, and collieries, orders for appreciable quantities of castings keep these foundries favourably employed.

The light-castings trade is hoping that the relaxation of the financial restrictions will bring some improvement in the demand for castings in the near future. These foundries have capacity available to undertake a much larger tonnage than has been forthcoming for some time past.

The re-rollers are able to obtain promptly all their requirements of steel semis from home steelworks, but orders are scarce and fall far short of the tonnages available. Holiday influences are now reducing outputs and demands, and will continue to do so until the end of August. The orders on hand at the re-rollers show little improvement, and are insufficient to provide for full-time working. Home trade is quiet and export business difficult to obtain against the keen competition from makers overseas.

Non-ferrous Metals

Non-ferrous metal markets have had very little to say for themselves despite the gravity of the international situation. Indeed, the lessening tension in the Middle East has led to a weakening in the quotations for lead and zinc, but the undertone for copper remains steady.

The firmness of copper in London can be attributed to a combination of several factors. Statistics released in the United States show that copper production in June was noticeably lower and that actual shipments and order-books have both taken on a more cheerful appearance. More than that, fabricators' stocks have declined and the uniform price for producers and custom smelters is holding steady at 26½ cents a pound. There is, too, the happy announcement that copper stocks in London Metal Exchange warehouses were only a little over 13,500 tons at the end of last week, although it ought to be noted that inventories rose from the preceding week by 775 tons—the first increase for some months.

The outlook in the weeks ahead seems better than would be normally warranted in the holiday season. This is due to hope that the lessening of trade restrictions with Russia and China will result in more copper being sent to those two countries. Also, the improvement in the US economic position as evidenced by rising steel production and the strengthening of other basic economic indicators is a bullish influence, as is the fact that the Interior Committee of the House of Representatives has now approved the Metal Subsidy Bill, which includes, among other proposals, the one-year copper stockpiling programme for up to 150,000 tons of domestic copper at market prices up to 27½ cents a pound.

Tin has been a patchy market on both sides of the Atlantic. Activity was virtually at a standstill in front of the communiqué issued by the International Tin Council last week. In the event, the communiqué did little to please the market. The chairman of the council, M. Georges Peter, announced that negotiations with Russia, Japan, western Germany, and the United States on the subject of their joining the tin agreement had not yet been completed. The chairman also stated that by the end of March last the buffer stock manager had bought 22,440 tons of tin. On the subject of quotas the chairman inferred that the council had decided that from October 1 until the end of the year the present 40 per cent. restriction on the export of tin will be increased to 48 per cent., thereby reducing the total permissible shipment during the period to only 20,000 tons. The market reacted favourably to the further cut in tin export, but later in the week the cash price was seen drifting back towards its support point of £730 a ton. In America buying is sporadic, but the price is holding above 96 cents a pound.

Lead is quiet in London and dull in New York, where the price is called 11 cents a pound. The market on both sides of the Atlantic is heavily influenced by the progress of the Price Support Policy Bill. The present position is that the Interior Committee of the House of Representatives cut back subsidies on lead at the request of the Administration to 3.90 cents a pound, thereby rejecting the House Sub-Committee's recommendation of 4 cents a pound. Opinion is that the introduction of this Bill will stimulate US domestic production and thus weaken the present quotation.

Zinc is also without feature and the price in London is gradually, but persistently, easing to lower levels. In America trading is far from brisk and the price remains unchanged at 10 cents a pound. The Interior Committee in approving the Metals Subsidy Bill cut back the subsidy on zinc to 2.90 cents per pound.

Tyneside's New Dry Dock

Work has commenced at the Palmers Hebburn Works of Vickers-Armstrongs (Shipbuilders), Limited, on the development scheme to provide a large new 850-ft. dry dock and a new 600-ft. deep-water quay at the yard. Construction of the quay has begun, while preliminary work is in progress on the clearing of the site of the dock. Work on the construction of the dock itself is due to start next month.

Facilities for tankers of up to 80,000 tons d.w. will be provided by the new dock and quay, which will be in service by 1961. Vickers-Armstrongs, however, has a further long-term plan under which it will eventually extend the dock to 1,000 ft. to accommodate tankers of up to 120,000 tons d.w.

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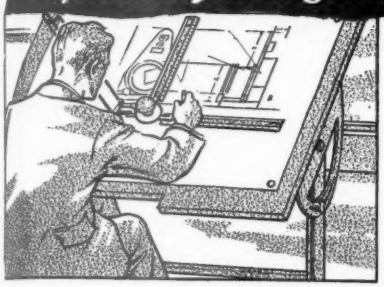

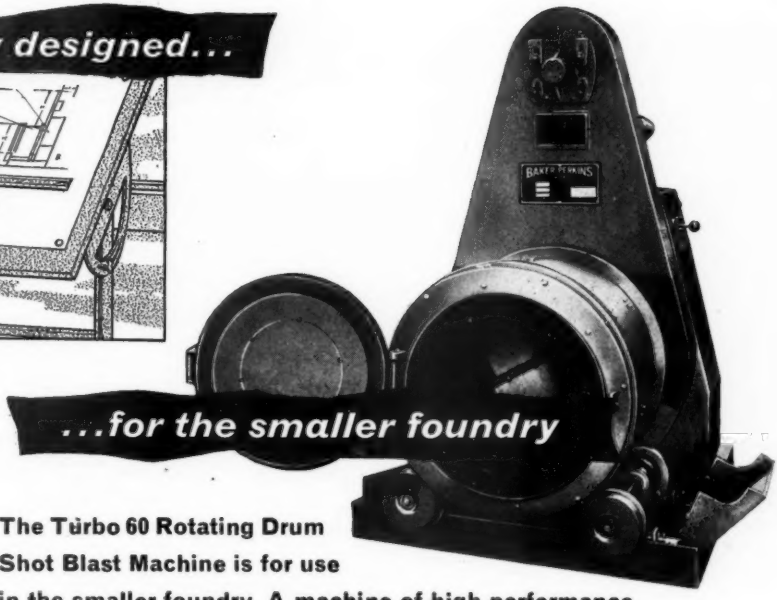

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Current Prices of Iron, Steel, and Non-ferrous Metals

(*Delivered unless otherwise stated*)

July 30, 1958

PIG-IRON

Foundry Iron.—No. 3 IRON, CLASS 2:—Middlesbrough, £21 6s. 0d.; Birmingham, £20 18s. 3d.

Low-phosphorus Iron.—Over 0.10 to 0.75 per cent. P, £23 17s. 0d., delivered Birmingham. Staffordshire blast-furnace low-phosphorus foundry iron (0.10 to 0.50 per cent. P, up to 3 per cent. Si), d/d within 60 miles of Stafford, £24 1s. 3d.

Scotch Iron.—No. 3 foundry, £25 3s. 6d., d/d Grangemouth.

Cylinder and Refined Irons.—North Zone, £25 19s. 0d.; South Zone, £26 1s. 6d.

Refined Malleable.—P, 0.10 per cent. MAX.—North Zone, £27 6s. 6d.; South Zone, £27 9s. 0d.

Hematite.—Si up to 2 per cent., S. & P. over 0.03 to 0.05 per cent.:—N.-E. of England (local iron), £25 6s. 6d.; Scotland (Scotch iron), Zone S.1, £25 13s. 0d.; Sheffield, £26 15s. 0d.; Birmingham, £27 4s. 0d.; Wales (Welsh iron), £25 6s. 6d.

Basic Pig-iron.—£20 3s. 0d., delivered Staffs, Derbyshire, Notts, Lincs, Rutland, Northants, and Leics.

FERRO-ALLOYS

(*Per ton unless otherwise stated, delivered*)

Ferro-silicon (6-ton lots and over).—45 per cent. Si, £47 0s. 0d. to £47 10s. 0d., scale 17s. 0d. per unit; 75 per cent. Si, £66 0s. 0d. to £66 10s. 0d., scale 17s. 0d. per unit.

Ferro-vanadium.—50/60 per cent., 22s. 6d. per lb. of V.

Ferro-molybdenum.—65/70 per cent., carbon-free, 12s. 6d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., 2-3 per cent. Cu, £250 0s. 0d.; 38/40 per cent., commercially carbon-free, £287 0s. 0d.

Ferro-tungsten.—80/85 per cent., 6s. 6d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 9s. 6d. per lb. of W.

Ferro-chrome (6-ton lots and over).—4/6 per cent. C, £91 10s. 0d., basis 60 per cent. Cr, scale 30s. 0d. to 30s. 6d., per unit; over 6 per cent. C, £87 10s. 0d., basis 60 per cent. Cr, scale 30s. 6d. per unit; 2 per cent. C,* 2s. 0d. per lb. Cr; 1 per cent. C,* 2s. 0½d. per lb. Cr; 0.15 per cent. C,* 2s. 1½d. per lb. Cr; 0.10 per cent. C,* 2s. 1¾d. per lb. Cr; 0.06 per cent. C,* 2s. 2d. per lb. Cr.

Metallic Chromium.—98/99 per cent., 6s. 10d. per lb.

Metallic Manganese.—94/96 per cent., carbon-free, £265 0s. 0d.; 96/98 per cent., £295 0s. 0d.

Ferro-columbium.—65/72 per cent., Nb + Ta, 19s. 9d. per lb., Nb + Ta.

Ferro-manganese (home).—78 per cent., £78 0s. 0d.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs.—BASIC: Soft u.t. £32 15s. 6d.; tested, 0.08 to 0.33 per cent. C, £33 15s., 6d.; hard (0.41 to 0.60 per cent. C), £34 17s. 0d.; silico-manganese, £43 16s. 6d.; free-cutting, £36 14s. 6d. SIEMENS MARTIN ACID: Up to 0.25 per cent. C, £41 1s. 0d.; silico-manganese, £44 4s. 0d.

Billets, Blooms, and Slabs for Forging and Stamping.—Basic, soft, up to 0.33 per cent. C, £38 10s. 0d.; basic, hard, over 0.41 up to 0.60 per cent. C, £39 12s. 6d.; acid, up to 0.25 per cent. C, £43 4s. 0d.

FINISHED STEEL

Heavy Plates and Sections.—Ship plates (N.-E. Coast), £42 2s. 0d.; boiler plates (N.-E. Coast), £44 12s. 0d.; floor plates (N.-E. Coast), £43 11s. 0d.; angles (N.-E. Coast), £39 16s. 6d.; joists (N.-E. Coast), £39 12s. 6d.

Small Bars, Sheets, etc.—Rounds and squares, under 3 in., and flats, 5 in. wide and under, untested soft basic, 50 tons and over, £40 0s. 6d; under 10 tons to 4 tons, £40 18s. 0d.; under 4 tons to 2 tons, £41 3s. 0d.; hoop and strip, coils, £39 0s. 0d.; uncoated strip mill coils, hot rolled, under 3mm. to 12g., £44 16s. 0d.; black sheets (hand mill), 24g., £58 14s 6d.; galvanized corrugated sheets, 24g., £66 16s. 0d.

Alloy Steel Bars.—1 in. dia. and up: Nickel, £68 10s. 0d.; nickel-chrome, £99 11s. 0d.; nickel-chrome-molybdenum, £111 19s. 0d.

NON-FERROUS METALS

Copper.—Cash, £205 15s. 0d. to £206 0s. 0d.; three months, £205 15s. 0d. to £206 0s. 0d.; settlement, £206 0s. 0d.

Copper Tubes, etc.—Solid-drawn tubes, 1s. 11¾d. per lb.; rods, 232s. 9d. per cwt. basis; 20 s.w.g., 266s. 0d. per cwt.

Tin.—Cash, £730 10s. 0d. to £731 0s. 0d.; three months, £734 0s. 0d. to £734 10s. 0d.; settlement, £731 0s. 0d.

Lead (Refined Pig).—Second half July, £71 7s. 6d. to £71 10s. 0d.; second half October, £72 12s. 6d. to £72 15s. 0d.

Zinc.—Second half July, £64 2s. 6d. to £64 5s. 0d.; second half October, £64 15s. 0d. to £64 17s. 6d.

Zinc Sheets, etc.—Sheets, 15g. and thicker, all English destinations, £97 15s. 0d.; rolled zinc (boiler plates), all English destinations, £95 10s. 0d.; zinc oxide (Red Seal), d/d buyers' premises, £87 0s. 0d.

Brass Tubes, etc.—Solid-drawn tubes, 1s. 7½d. per lb.; sheets to 10 w.g., 171s. 3d. per cwt.; wire, 2s. 5d.; rolled metal, 171s. 3d. per cwt.

Brass (Brazing).—BS1400, B3 (65/35), £139; B6 (85/15), —; BS249, —.

Brass (High Tensile).—BS1400, HTB1 (30 tons), £168; HTB2 (38 tons), — ; HTB3 (48 tons), —.

Gunmetal.—BS1400, LG2 (85/5/5/5), £168; LG3 (86/7/5/2), £179; G1 (88/10/2/½), £237; (88/10/2/1), £226.

Phosphor Bronze.—BS1400, PB1 (AID released), £258 per ton.

Phosphor Bronze Strip, etc.—Strip, 254s. 3d. per cwt.; wire, 3s. 9d. per lb.; rods, 3s. 0½d.; tubes, 3s. 0½d.; chill cast bars: solids 3s. 0d.; cored 3s. 1d. (CHARLES CLIFFORD, LIMITED.)

Nickel Silver, etc.—Rolled metal, 3 in. to 9 in. wide × 0.056, 3s. 6½d. per lb.; round wire, 10g. in coils (10 per cent.), 3s. 11d.; special quality turning rod, 10 per cent., ½ in. dia., in straight lengths, 3s. 10d. All prices are net.

Other Metals.—Magnesium, ingots, 2s. 5½d. per lb. Antimony, English, 99 per cent., £190 0s. 0d. Quicksilver, ex-warehouse, £79 0s. 0d. Nickel, £600 0s. 0d. Aluminium ingots, £190 0s. 0d.; aluminium bronze (BS1400), AB1, —; AB2, —.

* Average 68-70 per cent.

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CENTRAL: 1558

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93, Hope Street.
CENTRAL: 9969.

New Catalogues

Cupola Spark Arresters.—A six-page, well-illustrated folder, covering the subject of spark arresters, has been issued by the Constructional Engineering Company, Limited, Charles Henry Street, Birmingham, 12, as their publication No. 213. The Clean Air Act comes in for mention, but this folder rightly stresses the economies to be gained by the actual foundries installing efficient spark-arrester equipment. For many years, the more progressive iron foundries have been installing spark arresters for the economies which resulted from decreased maintenance costs of adjacent buildings. The most impressive illustration shown in this folder is of the penthouse type which spans two or more cupolas, and seems to be particularly effective. The wet grit arrester is a more recent development and its worth is testified by a letter from a prominent foundry executive. The appearance of this folder is opportune.

First-aid Equipment. A new catalogue—No. 44—recently released by Cuxson, Gerrard & Company, Limited, Oldbury, Birmingham, opens with the regulations concerning first aid which are applied generally and specifically to each industry. For instance, in foundries where more than 500 are employed, an ambulance room must be provided. This section is distinctly useful, but the balance of the catalogue—166 pages—is of greater interest as it details the requisites necessary for the fulfilment of the regulations and some are quite essential but not specified. Moreover, in each case the catalogue discloses that several types of each sort of equipment is available, and this may vary. For instance, in some industries hand or foot wounds predominate and more attention must be given to the provision of equipment for the proper handling of such cases. This is the type of catalogue, essentially businesslike, that should be in the hands of every foundry chief executive.

Goods-handling Schemes. Paterson Hughes Engineering Company, Limited, Bedford House, Bedford Street, London, W.C.2, and elsewhere, have issued section 1 of what eventually will be a comprehensive catalogue covering the whole field of their activities. Whilst a variety of manufactures are covered in this section, there are no fewer than nine devoted to the foundry industry. By and large, the body of the catalogue consists of a series of captioned illustrations which are left to tell their own story. This first section carries 28 pages and good use is made of colour, especially for picking out cardinal points in the various installations illustrated. The range of plant shown covers belt, roller, overhead chain, slat, screw, driven roller, chain and sliding plate conveyors, overhead cranes, telphers, elevators, skip hoists, and drag-link conveyors—unquestionably a comprehensive list.

Corebinder. From Chas. Page & Company, Limited, 52, Grosvenor Gardens, London, S.W.1, the agents for Mo Och Domsjö A.B., of Sweden, has been received an eight-page brochure, which details mixes incorporating Modocore, of which there are several varieties. One is a straight application as a binder, another is for cores for ingot moulds, and is made from 80 gallons used sand, 20 gallons new sand, 6 pints of soot (possibly blacking) and 5 pints of Modocore Vit. It is baked between 150 and 200 deg. C. Other paragraphs deal with its use when preparing oil sand, urea-resin sand, self-hardening cores, those containing cement and a special core wash. Some quite interesting claims are made. Included with the brochure was a report on Modo core oil, an esterified tall oil.

Indirect-arc Furnace. Clino Foundry Supplies, Limited, 25, Clyde Vale, Forest Hill, London, S.E.23, have submitted two leaflets covering two types of Clino indirect-arc furnaces. One has a capacity of 50 to 100 lb. and the second 20 lb. The former, using a Zirconal (zirconite based) lining, melts a charge every 50 min. It carries water-cooled electrodes and has lip-axis pouring. Interchangeable lift-off bodies are available. Good diagrams and a shipping specification add to the use of the leaflet. The smaller furnace is stated to melt 18 lb. of beryllium-copper in 10 min. or 20 lb. of stainless steel in 32. In both cases the specification for the transformers are included.

Adjustable Working Platforms. A catalogue has been published by Access Equipment, Limited, Maylands Avenue, Hemel Hempstead, Herts. It describes and illustrates a series of well-designed portable equipment which enables operators to work at heights, either in "pulpits" or on platforms. One application is in foundries, where the pouring of large castings can then be carried out at the most convenient height.

Clean Air Scrubbers. Publication 6510 issued by the Sturtevant Engineering Company, Limited, Southern House, Cannon Street, London, E.C.4, is of special interest at the moment as it deals with the problem of industrial-dust collection. Moreover, the data and illustrations used have been largely drawn from installations made in connection with foundry practice. Descriptions have been given of the Walbrook, Thames and Bankside scrubbers, and the last section deals with sludge disposal.

Goggles and Eye Shields. With the passage of time, personal preference for goggles becomes more insistent. It is difficult to standardize on one type as all sorts of likes and dislikes present themselves. In a supplement to catalogue No. 156, the safety equipment division of J. & R. Fleming, Limited, 146, Clerkenwell Road, London, E.C.1, illustrate and describe a wide range of goggles, amongst which the most pernickety of foundry workers and welders should find something to satisfy their whims.

Scientific Apparatus. Three catalogues have been received from the Cambridge Instrument Company, Limited, 13, Grosvenor Place, London, S.W.1, covering recording accelerometers (149/1); gas analysers (144/B/1); and electrical instruments (163/1). The last catalogue covers a wide range of galvanometers, voltmeters, ammeters, wattmeters, and similar instruments.

Electrical Machinery and Apparatus. The Ateliers de Constructions Electriques de Charleroi, Belgium, has issued a catalogue in the English and French languages, which illustrates and describes the company's very wide selection of electric plant. It ranges from power stations to television reception sets.

Standard Gas-fired Muffles. A leaflet—V.26A—received from the Incandescent Heat Company, Limited, Cornwall Road, Smethwick, cancels and replaces V.26. It covers a range of furnaces—ten in all, of capacities from 12 by 12 in. to 48 by 36 in.